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SYDNEY.

## Transactions of the Australasian Medical Congress (British Medical Association)

Second Session: Dunedin, February 3 to 10, 1927



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## SECTION VII.—OTOLOGY, RHINOLOGY AND LARYNGOLOGY.—*Continued.*

### NEURO-OTOLOGY.

By ROBERT PULLEINE, M.B., Ch.M. (Sydney),  
Adelaide.

(Continued from page 96.)

#### *Cerebello-Pontine Angle Tumour.*

W.S., a female, aged twenty-six years, fell on board ship in November, 1920. After that she had pains across the eyes every morning with spectral green balls and shining lines in front of the eyes when she closed them. Gradually the sight became blurred. She had amaurosis on moving for a few seconds and sometimes even when keeping still.

Three years ago she had felt dizzy on turning her head and noticed that she has had a tendency to fall to the left since with a little unsteadiness in her left arm and leg.

She had had partial deafness in her left ear all her life; her hearing had become very defective during the last two years.

She has almost continuous frontal headaches.

Her mouth was slightly drawn to the right. All the deep reflexes were very active. The finger to nose test gave an imperfect response on the left side. Romberg's sign was present, more evident with the left foot. She walked to the right with her eyes shut and fell to the right.

The overthrow test yielded a positive response.

There was total deafness of the left ear, but the right ear was normal.

Well marked optic neuritis was seen. The vestibular tests yielded complete absence of any response from the left labyrinth.

The diagnosis was a left acoustic tumour.

On January 14, 1921, Dr. Newland operated and removed an acoustic tumour from the left side.

In 1923 she was quite well; spontaneous nystagmus was present with slow movement to the right.

In 1924-1925 she reported that she had kept well except that she was very emotional and still had right facial paresis.

#### *Cerebellar Neoplasm.*

H.N.W., a male, was first seen on June 12, 1925.

The duration of his symptoms had been one year.

He had had an attack of dizziness and trembling with partial loss of consciousness lasting two days. After this if he started to do any manual work, he became very dizzy and had to give up concentration and his memory became defective. He had collapsed on several occasions, once while in the bath and had been unconscious for from twenty to two hundred minutes.

He could see, hear, smell and taste normally. The weakness of his legs began twelve weeks ago and had been progressive.

There was deviation of the left hand and foot.

Ten days ago weakness in the pelvis appeared after a trembling attack with severe headache.

Headaches began over six months ago, always occipital, until lately when they have become more general. At the time of examination there was tenderness on pressure over the posterior fossa at a point above and to left of the occipital protuberance. He did not vomit, but felt nauseated when he had dizzy turns; the surrounding objects seem to move.

All cranial nerves were apparently intact; there was no optic neuritis; he had high functional acuity of hearing. He could not stand without support. There was no spontaneous nystagmus nor past pointing.

On turning there was good normal nystagmus; past pointing was quantitatively poor and the right arm failed to past point on rotation to the left.

The caloric test with douching at 20° C. (68° F.) both to the right and left, the right arm failed to past-point and there was inverse past pointing of the left arm to the left with the head held back to 60°.

The diagnosis was an infiltrating tumour or cyst of the cerebellum involving the vermis and both hemispheres, probably beginning in and most extensive on the right side.

Dr. Scott performed an operation which lasted for two hours on June 20, 1925.

Bilateral cerebellar decompression was done, the posterior edge of the *foramen magnum* being removed with the adjacent *squama occipitalis*. On incising the *dura mater* to the left of the occipital sinus the arachnoid bulged with fluid twelve and a half millimetres (half an inch) in depth over an area of about three and three-quarter centimetres (one and a half inches) in diameter. On the right side there was no such cystic distension. After the arachnoid had been slit up, the roof of the *cisterna magna* could be distinguished below. Search of the superior and inferior surfaces to the cerebellum revealed nothing further.

A week after the operation he was found to have lost the deviation of the left hand and left foot. When he first walked again, he no longer tripped with his left toes.

#### *Toxæmic Vertigo (Dental).*

Mrs. R.B., aged thirty-two years, was first seen on May 18, 1921.

There was a history of giddiness for four months. Objects seemed to go anti-clockwise. She had a feeling of propulsion and drifted to the left on walking with her eyes shut. On standing still she fell back. On looking up to the right she became giddy. There was no Rombergism, incoordination or ataxy. The reflexes were normal and the organs were normal. The eyes and ears were normal. Her two upper incisors were dead; one was tender on pressure.

The vestibular tests revealed spontaneous giddiness on turning the head to the right. No spontaneous nystagmus or past pointing was noted. The pelvic reactions were normal.

Rotation nystagmus was qualitatively and quantitatively normal.

Past pointing was absent in all directions.

The caloric nystagmus was normal. Past pointing was absent in all directions.

Toxæmia of dental origin was diagnosed. To be cerebellar the lesion would have to be at the decussation of the superior cerebellar peduncles.

Dental attention was followed by rapid disappearance of the vertigo.

*Toxæmic Vertigo (Nicotine).*

H.L.S., aged fifty-five years, was seen on May 17, 1921. In October, 1919, he had his first attack of giddiness which lasted several days. A feeling of falling accompanied movements of the eye. Since then he had had many giddy attacks.

Tinnitus in left ear had been present for years. His hearing was bilaterally impaired, worse on the left side. He had frontal headaches. He walked badly in the dark and vomited during his giddy attacks. He had had no previous illness. He drank beer chiefly. For forty years he had smoked a quarter of a pound of tobacco weekly.

In the right eye there was old external strabismus with amblyopia. The left eye was normal.

Hearing of the watch on the right side was  $\frac{m}{100}$  and on the left  $\frac{m}{100}$ .

In regard to the vestibular tests turning produced nystagmus normal in direction, lasting for twenty seconds. Past-pointing in all directions was absent.

The diagnosis was toxæmic labyrinthitis.<sup>1</sup> The treatment consisted in forbidding tobacco and exhibiting potassium iodide and potassium bromide. There was rapid improvement.

Within two months all giddy attacks ceased.

**Bibliography.**

1. R. Bárány: "Untersuchungen über den vom Vestibular-apparat des Ohres reflektorisch ausgelösten rhythmischen Nystagmus und seine Begleiterscheinungen," *Monatschrift für Ohrenheilkunde*, 1902, Band XL, Seite 193.
2. R. Magnus: "Körperstellung," page 514.
3. I. Jones and L. Fisher: "Equilibrium and Vertigo," Chapters XIV, XV, XVI, XVII.
4. P. Poirier: "Anatomie Humaine" (article on *Canales semicirculaires*).
5. E. Villiger: "Gehirn und Rückenmark," Auflage II, Seite 71-76.
6. W. Spalteholz: "Handatlas der Anatomie des Menschen," Band III, Seite 815.
7. A. Högyes: "Über den Nerven-mechanismus der assoziierten Augenbewegungen," *Monatschrift für Ohrenheilkunde*, Band XLVI, Hefte 6, 7, 8.
8. S. S. Maxwell: "The Relations of the Individual Ampullæ of the Semicircular Canals to the Individual Eye Muscles," *The Journal of General Physiology*, Jacques Loeb Memorial Volume, Volume VIII, No. 5, pages 441-448.

**THE DIAGNOSTIC VALUE OF THE VESTIBULAR REACTIONS.**

By H. M. JAY, M.B., B.S. (Adelaide),  
Adelaide.

This paper is an attempt to place before you some figures relating to the importance of the vestibular reactions, considered as an aid to diagnosis in obscure cerebral affections. I must confess that when I began to collect some facts regarding these cases, I hoped to find a considerable amount of material available for analysis, sufficient at any rate to arrive at some conclusions as to the usefulness of these reactions in the hands of the average observer (if I may so style myself). Unfortunately (or fortunately according to the view point) very few of the patients came to the *post mortem* room and very few showed any record of positive findings at operation, whilst a large number were medical patients whose condition was sufficiently obscure to make the attendant physician hesitate to commit himself to a definite diagnosis regarding the pathological change present, whatever might be his beliefs

as to its location. The relatively small number of cases lessens the value of these figures, but not their interest.

In considering the conduct of these tests certain factors must not be overlooked which may have a bearing on the findings.

Firstly, there comes the question of previous knowledge of the patient. By this I mean that if certain facts concerning the history of the patient or the signs and symptoms of his complaint are communicated to the person conducting the vestibular tests, his outlook immediately becomes affected by these and his diagnosis is apt to be based not only on the reactions to turning, douching and so on, but on the whole clinical picture as he sees it with all the knowledge at his disposal.

Secondly, variations in technique must be considered. By this I mean to imply that not every individual follows the same routine regarding for example the exact position of the head, the exact temperature of the water used *et cetera*. Possibly the same observer does not always adhere strictly to small details.

Thirdly must be considered errors in observation. This is most important to remember and if any doubt exists in the mind of the observer, the tests should be repeated; it must not be forgotten that difficulties may be increased by inattention to the details mentioned in the preceding paragraph. As an illustration let me call to your mind the cases that some of you have seen, in which it is well nigh impossible to say with certainty whether a nystagmus is rotary or horizontal. In this instance it is more likely than not that the position of the head is faulty and the responses are elicited from both horizontal and vertical canals in a modified degree, the result being neither a pure rotary nor a pure horizontal nystagmus. Again, in estimating the past pointing we have all seen the arm starting off with a marked deviation and coming back to its objective with a lateral sweep against the past pointing impulse. How are we to interpret this? My own feeling is that the pointing reaction should be considered as being present, the backward sweep representing a conscious readjustment by reason of the patient's acquired knowledge of his error.

Lastly there are errors of interpretation and here I think, we must look for most of our mistakes. Given a fairly complete grasp of the mechanism of these tests as far as our knowledge extends, and a considerable amount of practice in their performance, the errors under the first and second paragraphs should not be numerous; but the ordered consideration of our data and the conclusions to be drawn therefrom are very different matters. In the first place our knowledge of the functions and reactions of important parts of the brain stem is as yet incomplete and certain working hypotheses, for example that of cerebellar localization, are still awaiting proof. In the second place there is the factor of individual error in consideration of the elicited responses to stimulation. I have often sat and pored over my results in a vain endeavour to draw definite conclusions from them; I have decided that I must have erred somewhere in detail or

<sup>1</sup> Magnus has shown that the toxæmia of nicotine affects the vestibular nuclei and not the labyrinth.



observation; I have repeated the tests with identical results and ended by admitting that I could not translate them satisfactorily. Now also, we are being introduced to fresh mysteries: the otolith and postural reflexes of Magnus, Kleijn and Quix. Though as yet the clinical uses of these are in their infancy, they serve to cloud the picture, hanging over us in our testing as possible disturbing factors which have to be reckoned with. Now let us consider some figures and cases.

I find that I have notes of fifty-eight patients whose vestibular reactions I have been called upon to examine. Unfortunately I have not kept notes of all tested, so that a lot of material useful for this paper has been lost. The cases are conveniently divisible into four classes as follows:

1. Those in which no definite diagnosis has been arrived at by the physician in charge of the patient.

2. Those in which the subsequent history of the patient, taken in conjunction with the clinical findings, justifies the assumption that the diagnosis made from all available data was probably correct.

3. Those cases in which the diagnosis was proved or disproved by operation or *post mortem* examination or in which the subsequent history of the illness coupled with the clinical findings fully substantiated the diagnosis.

5. Cases in which I was unable to arrive at any conclusions as the result of testing the vestibular functions.

1. Lest the numbers under this heading (sixteen) should appear to be unduly large and therefore to reflect on the ability and skill of those attending them, let me say that I have done my best to unearth all available information by reference to hospital records and in some cases by conversation with those directly responsible for the treatment of the patient.

2. An analysis of this group shows the following: Six patients were tested and of these the reports concerning two were in accordance with the final diagnosis, whilst in the remaining four the findings were not compatible with the other neurological signs. These four cases were labelled respectively neurasthenia, hysteria, facial paralysis and neuralgia, *encephalitis lethargica*, so that in three at least there is a possibility of further developments which may confirm the results of the vestibular tests.

3. The next group consists of eighteen cases in which the diagnosis by means of the vestibular reactions can be said to have been proved or disproved. The details are as follows:

REPORT MADE FROM VESTIBULAR TEST.

1. Eighth nerve tumour.
2. No abnormality detected.
3. Great increase of sub-tentorial pressure probably without involvement of medulla or cerebellum.
4. Toxic labyrinthitis.
5. Complete loss of labyrinthine response—probably syphilitic.

RESULT.

- Eighth nerve tumour removed.
- Recovered.
- Autopsy revealed a cerebral tumour.
- Recovered.
- The serum yielded a positive Wassermann reaction.

REPORT MADE FROM VESTIBULAR TEST.

6. Lesion of the left cerebellar peduncle.
7. Involvement of the right cerebellar cortex.
8. Normal responses, ? hysteria.
9. Loss of function of medulla and pons, probably increased cerebral tension.
10. Lesion of the upper portion of the pons in region of cerebral crura involving the left side more than the right.
11. Toxic labyrinthitis.
12. Decreased labyrinthine irritability, ? toxic.
13. Disseminated sclerosis.
14. Affection of the left cerebellar cortex.
15. Lesion probably at base of cerebral crura cutting off all impulses.
16. Decreased labyrinthine irritability.
17. Irritability of medulla, ? increased tension in the fourth ventricle.
18. Normal responses.

RESULT.

- History of injury; the X ray and clinical findings confirmed the diagnosis.
- A tumour removed from the right lobe of cerebellum.
- Recovered.
- Cerebral tumour found at autopsy.
- At autopsy a tumour was found in position stated.
- Recovered.
- Spastic paraplegia.
- Disseminated sclerosis.
- Cerebral syphilis.
- Disseminated sclerosis.
- Spastic paraplegia.
- Disseminated sclerosis.
- Epilepsy.

On examination of these results it is seen that with the exception of Nos. 12, 15, 16, 17, 18 (that is two with disseminated sclerosis, two with spastic paraplegia and one with epilepsy) the test provided reliable information.

The two cases of spastic paraplegia are of interest in that the same report was made in each case, namely diminished labyrinthine irritability. It would be instructive to know if this is a constant finding in this disease.

In five cases of brain tumour tested by the vestibular reactions three were accurately localized and of these two were successfully operated. The two not localized were supratentorial and the reactions elicited pointed merely to increased sub-tentorial pressure.

The finding of toxic labyrinthitis in two cases was of value as eliminating the possibility of any serious cerebral affection. One of these patients had been given a very dismal prognosis by his family physician, although the latter had not committed himself to any definite diagnosis.

In Nos. 2 and 8 the negative findings also had a distinct value and the patients were ultimately discharged from the hospital free from symptoms and with a diagnosis of hysteria.

No. 10 was of great interest as the physician in charge of the patient told me that the ordinary neurological examination did not suggest involvement of the area mentioned and he was sure that the tests were misleading in this instance.

4. In the remaining eighteen cases in the series the results on testing were not sufficiently definite to warrant a report being made and as it happens that the records do not give any illuminating information regarding the physician's opinion on most

of them, there is nothing to be learned from them. The figures arrived at may be set down as follows:

| Diagnosis.                                  | Number. | Percentage of Total. | Percentage of Total Correctly Diagnosed or Giving Important Information. |
|---|---------|----------------------|--|
| None definitely formed ..                   | 16      | 28                   | —  |
| Probably correct                            | 6       | 10                   | 2  |
| Proved or disproved ..                      | 18      | 31                   | 22   |
| No definite conclusions from testing formed | 18      | 31                   | —  |
| Total .. ..                                 | 58      | 100                  | 24   |

Stated briefly the facts are that in a total of fifty-eight patients correct information was supplied by means of vestibular stimulation in fifteen or 24%. This may not appear to be a very good result, but it is to be remembered that in a series such as this there will certainly be many patients concerning whom it is hardly likely that any useful information can be drawn. Group 1 has many of these, the patients merely being sent to have the vestibular tests performed on the off chance that they might throw light on an obscure condition. Group 4 also contains some of these. The percentage of successes in those cases which were ultimately diagnosed with reasonable certainty (that is Groups 2 and 3) is surprisingly good, namely 62%.

#### Conclusions.

These tests appear to have a very definite value as an aid to diagnosis, provided that too much is not expected of them.

Lesions affecting the labyrinth and eighth nerves and the cerebellar cortex should be diagnosable in the great majority of cases.

Judging from the fact that the only two proved peduncular lesions were correctly diagnosed, it appears that the tests are of value in these cases.

Proved cases of lesions in the *pons* or medulla do not figure in the series, so no conclusions can be drawn regarding them.

Negative findings are of distinct value in eliminating disease of the brain stem.

DR. HARDIE NEIL (Auckland) said that the demonstration was a complete exposition of the modern conception of the anatomy and physiology of the vestibular apparatus. The diagrams and slides shown were particularly helpful. There was one principal point, the difficulty in tracing the tracts of the vertical canals through the middle peduncle. The clinico-pathological evidence, however, was positive that the tracts described by Jones were in existence. The apparent histological deficiency could not be accepted as excluding as the neurologists admitted, that they could not determine the existence of continuation of fibres upwards from the red nucleus. Yet the tract from the cerebellum upwards to the red nucleus must carry the motion sensing or vertiginous sensations. The inference was that there was a cortical centre for vertiginous sensation, possibly not a definitely localized centre; the association fibres undoubtedly distributed to the cortical area responsible for the reception of vertiginous impulses. These disturbing sensations of vertigo coming from labyrinthine stimuli passed up from the superior peduncles through the red nucleus and onwards through tracts whose existence could not be ascertained by histological methods.

In regard to testing by various methods much trouble was due to a lack of trained assistants. In large clinics trained nurses were a great help. In dealing with the conditions in which these tests were of value, he stated that they were valuable in unilateral eighth nerve lesions before any ocular signs of intracranial pressure had been noted. Bárány's tests yielded information. The cerebello-pontine angle lesion syndrome was a definitely established and accepted entity. These tests were essential for the elimination of the cerebellum in vertigo, when lesions of the posterior fossa and labyrinth had to be excluded and in chronic suppurative mastoiditis when the vital question of involvement of the labyrinth was raised.

SIR JAMES BARRETT (Melbourne) mentioned a case of double tumour of the auditory nerves; there was cerebro-spinal rhinorrhoea, total absence of caloric reaction with anomalous responses to hearing tests. *Post mortem* examination revealed tumours of both auditory nerves. He said that the disappearance of the caloric action occurred long before any optic neuritis in these patients.

DR. H. F. SHORNEY (Adelaide) as a practical point said that it was not necessary to use cold water at 20° C. (68° F.). Water at room temperature would answer as well. There was no need to use a douche can with prolonged douching. Water syringed into the ear and allowed to remain for half a minute was sufficient.

DR. W. J. MACDONALD (Wellington) mentioned three small points of technique: (i.) In past pointing there was often an involuntary movement of the observer's finger unless means were taken to avoid it; (ii.) a device consisting of strong convex glasses which yield clearer observation in indefinite nystagmus. They prevented the patient from fixing and they magnified the movement. (iii.) Sir Dundas Grant's cold air apparatus was useful instead of cold water.

DR. HARDIE NEIL showed cinematograph films for Dr. Isaac Jones, of Los Angeles. These films depicted orientation in animals, cats and dogs, lesions in animals and diseases in animals. Another film illustrated the results of Bárány's tests in various human diseases.

#### SECTION VIII.—NEUROLOGY AND PSYCHIATRY.

##### THE PLACE OF PATHOLOGY IN MENTAL HOSPITALS.

By OLIVER LATHAM, M.B. (Sydney),

Pathologist, Mental Hospitals Laboratories, New South Wales.

WHEN your Secretary wrote me that owing to the uncertain movements of your President-elect, Sir John Macpherson, you had elected me as the President of the Section, I at once called to mind that medical societies and congresses in their wisdom occasionally varied their custom of electing some distinguished scientist as their presidents and instead picked out some minor branch of their order needing encouragement, the Cinderella as it were of their faculty, for distinction. This procedure not only levered my specialty into a prouder position, but also permitted you to avow openly your recognition of its importance. Today you welcome into prominence the pathology of nervous and mental diseases. Bearing this in mind I feel that this address should deal mainly with the interests of this pathology, more especially as our late chief, Dr. Eric Sinclair, I suppose one of the last of an older school, laboured all his life to advance the scientific aspect of mental disease, making our pathology the corner stone of his edifice.

With your acquiescence, therefore, I propose to give the greater consideration to the possibilities

of laboratory work in the individual mental hospitals, at the same time reserving some space for the consideration of the duties of the central laboratory in deference to the wishes of your Secretary as revealed by his interpretation of my title.

I think, however, that our loss is great in that we have to deplore the inability of Sir John Macpherson to be in my place, as to him fell the unique honour of establishing the first psychiatric clinic in Australasia and because it gave him real pleasure to make full use of the facilities our laboratory provided both to illustrate his lectures and to further diagnosis in his clinic. He showed his keen appreciation of our pathology by arranging that his lectures should be interlarded with those of the pathologist, so that the students would be better connected with the physical aspects of mental disease.

True courtesy demands our paying grateful homage to those eminent pathologists recently passed away who may be said to have placed our specialty on the map. Naturally you will all think of Sir Frederick Mott, a man of the utmost versatility, the record of whose early offices bears repeating, revealing the wide outlook this father of mental pathology brought to bear on his subject, setting an example for all time of the benefits to be gained by the successful connexion of the work of one faculty with those others comprising a medical school or hospital.

Mott commenced by taking his bachelor of science degree with his diploma winning honours in forensic medicine. Next he became associated with the physiologist Schäfer at University College, working especially on the spinal tracts; eventually becoming Assistant Professor of Physiology at Liverpool. Later he was Assistant Physician at Charing Cross Hospital, then Lecturer in Physiology, exchanging ultimately into the lectureship of pathology. This led to his being appointed Pathologist to the London County Council, but so keenly did he feel the importance of keeping in touch with the clinical material of a general hospital while pathologist to mental patients, that he insisted on being allowed to keep on his position as Physician to the Charing Cross Hospital and some of the fruits of this today is the fact that Dr. Hogg has at last been able to arrange for some of his mental hospital resident medical officers to hold out-patient clinics in both metropolitan and country hospitals and thus the pathologist too has access to the material both quick and dead of a general hospital.

In the *Archives of Neurology and Psychiatry* and many current medical magazines he published articles establishing the association of syphilis with general paralysis of the insane, demonstrating the spirochaete alive by dark ground microscopic technique in the frontal lobes of those dying of this disease. He was thus justified in his belief that general paralysis of the insane could be diminished in incidence and possibly cured in the community, facts recently achieved according to the testimony of Dr. G. M. Robertson, who points out in his lectures on the aetiology of insanity that there had been a striking fall in the percentage incidence of

general paralysis of the insane in the community in the last few years and this he puts down to the introduction of the "606" group of drugs in the treatment of syphilis. As so many years elapse on the average between primary infection and the onset of general paralysis of the insane, this would correspond with the period that general paralysis of the insane would take to manifest itself if the syphilis had not been so successfully aborted. In women the diminution can also be put down to the work of the antivenereal campaign by which they were induced to seek early abortive treatment.

Mott used the immense amount of material at his disposal to contribute important articles on the heredity of some mental states and stressed the idea that mental instability in the parent may be followed by *dementia præcox* or mental deficiency in the children or collaterals at an earlier age and thus the unsound stock would tend to come to an end. Following up the pathology of these cases led to his epoch making contributions to the pathology of *dementia præcox*, wherein he drew attention to the coexisting nuclear chromatin defects in the cortical nerve cells, sexual organs of both sexes, as well as in the more important of the ductless glands. He also helped to establish asylum dysentery as an infective enteritis. I allude to his life's work because the late Dr. Froude Flashman modelled the New South Wales Mental Hospitals Laboratory on the lines of Claybury after a visit there in 1900.

Like many of the younger school of pathologists he took up work on clinical lines among the so-called "shell-shocked" soldiers at the Maudsley Hospital, at the same time setting up the new pathological laboratory there, instituting researches mentioned above and providing for the pathological teaching in connexion with the diploma in psychological medicine just established.

His *post mortem* findings in men dead of *commotio cerebri* provided a histo-pathological basis for some types of war psychoses, not to be confused with the psychic trauma without readily demonstrable lesion which is much commoner and is curable by psychological methods. Cole in his swan song makes earnest entreaty for the contest between the physiogenic and psychogenic schools to end in a happy division of the territory they dispute and to lessen the gap between the psychiatrist and the general practitioner. My part in the diploma course in New South Wales has been greatly facilitated by my experiences with the Maudsley Hospital staff and laboratory in 1919.

Another interesting personality, the late Professor Kulchitsky, was widely renowned beyond his Russian homeland by his researches in neurological technique before he carried out important researches in nerve endings at University College. America is the poorer in her loss of the learned Southard whose researches in the cellular pathology of epilepsy, primary dementia and other psychoses associated with cortical neuronic degeneration so often enriched the pages of the *American Journal of Insanity*. The many-sided McWeeney, of the National University, Dublin, in his zeal for neuropathology



logical material, made extensive examinations of spinal cords from the general hospitals and thus gave me the idea of utilizing our laboratory for similar work from the Sydney hospitals.

Many of you will remember the period when one was at a complete loss to account for a mechanism which could explain or produce the lesions classically associated with tabes and the combined sclerosis and perhaps some forms of infective peripheral neuritis.

The work of the late Dr. R. G. Rows and his colleague Dr. Orr at the Lancaster and Prestwich Mental Hospital laboratories are being quoted more and more by leading neurologists and surgeons to explain various pathological processes. You will remember that they elaborated the system of tracing the course of toxins from celloidin capsules containing living organisms by noting the successive changes in the reacting mononuclear cells beneath the epineurium, the older forms of which they called polyblasts and which are so common in chronic *encephalitis lethargica* and such like. By this means they showed that toxins travelled up the nerves and towards the cord, producing a reactive proliferative phenomenon in nerve, posterior spinal ganglion, pia-arachnoid and perivascular system with degeneration of myelin in the posterior tracts of the cord. When the same procedure was applied to the abdominal sympathetic ganglia or severe enteritis or colitis was induced, irritative lesions in the peritoneum and sympathetic ganglia were caused. Degeneration was induced only in the cord and in the area commonly involved in the combined sclerosis. In a word, when trophic nervous mechanisms or the quality of the blood was involved, you got a picture corresponding to that obtaining in the combined sclerosis, while with the toxins of living organisms acting on a nervous or other part, you got the irritative and proliferative phenomena, such as belongs to tabes, general paralysis of the insane and all that group as well as the phenomena present in nerves leading from septic neoplasms.

Rows also kept his pathology a living science by his active interest in clinical medicine and showed his wide attainments by his fine work on the psychopathology of the military patients in the hospital of which he had charge.

Mental pathology also owes a deep debt of gratitude to the work of the late Ford Robertson, who with other associates of the Edinburgh school did so much to improve pathological technique and give us those wonderful descriptive diagrams of the histology and pathology of the intracranial contents, especially the brain coverings and vascular systems involving original work by his surface section method and his improved metallic impregnations. He also believed in a live pathology and carried out many investigations into the association of bacteria with disordered mental function and neuronic metabolism.

My early pathology work in a country mental hospital would have been impossible without his simplified technique and expert knowledge of the possibilities of the frozen section method.

Our brilliant anatomist, Irvine Hunter, was as you remember keenly interested in the neurological side of his work and eagerly examined any pathological preparation which could throw light on an anatomical tract or structure and readily fell in with our suggestion that many a dry and uninteresting section of cord or stem might be made more intelligible by being shown as the seat of some tract lesion and thus creating an atmosphere of reality. But above all his investigations with Dr. Royle into the rôle of the sympathetic system in plastic tone reinvented attention to this system, so that we were enabled to follow the work of our Russian, French, British and American friends on the possible involvement of the sympathetic system in many diseased states. The interest he took in many phases of *encephalitis lethargica*, chiefly of course with clinical signs presuming involvement of the basal nuclei and stem, led us to examine many brains affected by this disease and thus we piled up an experience which served us in good stead when called upon to throw light on many cases of sudden or obscure death of persons whose brains appeared normal enough by the ordinary methods of investigation. Many of the earlier samples were handed to us by Dr. Inglis from the military hospitals. It perhaps came as a shock to me to realize in those days how quickly this obscure infection could imitate the early histological picture of general paralysis of the insane and together with Cleland, Ferguson and Matthewson, of Brisbane, I found "X" disease almost indistinguishable, at least histologically.

Froude Flashman after his *Wanderjahr* through the laboratories of France, Germany, Scotland and London at a time when mental pathology was in its infancy, came under Mott's influence and established the first neurological laboratory in the southern hemisphere. Working with Elliot Smith and J. T. Wilson and providing facilities for research work to many distinguished travellers from other States and abroad, he brought considerable credit to our laboratory and specialty chiefly by his observations on the anatomy and histology (normal and morbid) of Australian fauna, especially the Australian aboriginal. With Colonel Butler, D.S.O., he performed the first Bordet-Wassermann test in Australia and an opportune gift by registered post of a dozen tubes of the original "606" from Professor Wassermann himself enabled him to exhibit the first dose of "606" south of the line to a patient of Dr. McMurray at the Sydney Hospital; and at a time when vaccines were little known over here, he had a wide *clientèle* and published several papers on their successful use in neurological cases. He used to tell a story throwing an interesting sidelight on central European psychology. Wassermann was speaking and had clearly and emphatically laid down as a dogmatic axiom the specific nature of his test. An obscure doctor present meekly, but firmly stated that he had obtained a positive reaction in an exanthem, I think, scarlet fever. We are given to understand the offending interrupter was thoroughly sat on and the lesson borne on us from the whole affair was that one should be exceedingly cautious



about new truths denied the searching light of criticism.

Golgi who has just left us, exercised an enormous influence on his generation not only in neurology, but even in his studies on malaria, of interest to us today in the treatment of general paralysis of the insane, while his special black method of staining or metallic impregnation of the whole nerve cell unit revolutionized our conception of the neurone.

Many other names you doubtless call to mind. It may be of interest to record the opposition offered to scientific work our late Inspector-General had to contend with from his older staff. He actually had to await the retirement of some of them to institute many of his scientific ideas into their hospitals and even in 1910 when I joined the service, one medical superintendent bewailed the amount of money wasted on a laboratory which he could employ much more usefully clothing his patients, while another not only would use it in more extensive cultivation, but turned a new laboratory built for him into staff accommodation. Dr. Sinclair's great foresight was abundantly displayed in that he actually obtained twenty-six years ago accommodation from the medical school, wherein to establish the laboratory, hoping to use the favourable position, in close touch with the medical and scientific teaching faculties, for the ultimate establishment of the chair of psychiatry, the realization of which he just lived to see some three years ago.

#### Pathological Work in the Mental Hospitals.

The late R. S. Cole in a recent number of *The Lancet* wrote: "It does seem that advance in the anatomy and physiology of the nervous system must depend on progress in laboratory methods and the results of researches which we may expect to increase the field of the microscope and teach us more of the properties of the living cell." The Board of Control in their twelfth annual report make the following pregnant remarks:

Every public mental hospital, in our opinion, should possess a laboratory in which, in aid, and indeed as part, of clinical work, ordinary routine work can be carried out. Many modern methods of diagnosis and treatment cannot be carried out without the aid of a laboratory and it is not satisfactory to rely on the reports upon material sent to laboratories not connected with the hospital . . . the mere fact that work in the laboratory forms part of the daily medical life of the hospital infuses and maintains a spirit of inquiry and progress; and conversely the absence of such work must have a most dispiriting effect on a newly joined medical officer, fresh from his medical school and methods of examination practised in its hospital.

They further recommend that hospitals big enough to find pathological work for one medical officer even when helped by a laboratory assistant, should have that medical officer appointed at once and in the case of smaller mental hospitals, say, in country towns, the part-time services of a visiting pathologist. They also consider imperative the appointment of a properly trained laboratory assistant.

As a matter of fact in three or four of the country mental hospitals in New South Wales young pathologists setting up in these towns welcome the

chance of doing a little work for us in return for such little conveniences our hospital laboratories provide. Dr. Hogg gives every encouragement to such a scheme which together with the regular attendance of a mental hospital doctor at clinics held in the general hospitals bridges the gap between the mental hospital and the outside medical world to the mutual benefit of both.

Since our late Inspector-General's *penchant* for pathological work was so well known, one might have supposed that even worldly interests would have brought out among our medical officers at least a semblance of interest in things pathological and for the information of those in other States interested in such matters I propose to discuss this very subject, of which I have had a personal insight during some twenty-five years.

It may truthfully be summed up in the statement that exceedingly little interest in work of a pathological nature has been forthcoming from our mental hospitals except from a certain class of men who have ultimately achieved relative or absolute distinction in our specialty, as if this type believed that the pathology of mental diseases was at least one of the essential gates of approach to the mastery of psychiatry in whatever branch of it they might ultimately settle down. I would go further and say that these men could not have been barred from taking a deep interest in pathology as revealed by the fact that when in many cases they were denied the necessary reagents and instruments, they have at their own expense sent to other countries and provided themselves as well as having to give up much of their leisure period to provide the necessary time.

To mention instances, two medical superintendents, now Macquarie Street specialists, either started laboratories themselves or instituted *post mortem* examinations on an extensive scale with full and skilled notes at their respective mental hospitals; these men tended to specialize early. Another, the present Medical Superintendent of our chief psychiatric clinic, carried out a lengthy investigation into the constituents of the cerebro-spinal fluid before modern manuals were about and in conjunction with another medical superintendent, our chief exponent of clinical states associated with the ductless glands, carried out extensive investigations into the histological appearances of the ductless glands in over one hundred people chiefly in connexion with the aetiology of epilepsy and also carried out researches on the abnormal constituents of blood and cerebro-spinal fluid and urine in cases of epilepsy and states of coma and made the most frequent use of our laboratory for autogenous vaccines. Our youngest medical superintendent, whose promotion has been rapid, interested himself in gastric contents, fractional test meals and in conjunction with the Department of Anatomy, operative measures on animals to test ablation effects on nutritional or nerve functions. Our present Inspector-General always instituted a laboratory wherever he was stationed and never ceased by precept and practice to encourage pathological work among his juniors. It was probably because of his

relative non-success in interesting his medical staff that he used to induce his staff sisters to act as laboratory assistants, at least in country districts.

I have mentioned Froude Flashman as instituting a small laboratory in Parramatta Mental Hospital and thus qualifying himself for selection to tour Europe in 1900.

Still two more medical superintendents of our largest metropolitan asylums were keen pathologists before a plethora of administrative work stayed their hands, but they insist that the pathological side of hospital work is thoroughly done.

When chiding the others for their lack of interest, we have been met with such answers as: "Our hospitals are short handed either because we have to take up the course of the diploma in psychiatry or because we are doing the work of those who are taking it up" or they point out to us that not only is mental pathology a difficult specialty, but that the same applies to ordinary pathology which they mastered only to a sufficient extent to insure the passing of their fourth degree examination. My colleague, Dr. Inglis, has pointed out that even ordinary pathology is being subdivided to insure efficient technique; at the Sydney Hospital, where he is chief pathologist, they have three divisions with a specialist for each, biochemistry by Dr. Wardlaw, B.Sc., serology by Dr. Spearman and histology by himself, a lecturer in pathology to our medical school. We have to accept the fact that other specialties are rising up in our own fold of psychiatry, that we have psycho-pathology with all its attendant ramifications and this leaves neither time nor inclination for physio-pathology which is becoming increasingly difficult by reason of ever recurring discoveries and researches. We must also admit that psycho-pathology is attracting some of the ablest medical officers of our younger school.

It only remains to be added that our Inspector-General has met this situation by arranging that the pathological teaching in the diploma course includes the following practical work.

The would-be candidate must produce evidence in writing that his medical superintendent has successfully instructed him in *post mortem* work, the taking of blood for Bordet-Wassermann tests, agglutination tests, of cerebro-spinal fluid and the examination of the latter and of blood for cell counts and the giving of vaccines, while the pathologist also certifies that he can fix sections, cut, stain and mount on slides ordinary and nervous tissues by the freezing, paraffin and celloidin methods and examine the blood and other fluids for glucose, urea, uric acid, creatinine, total nitrogen and non-protein nitrogen and is conversant with ordinary bacterial and blood stains. When he returns to his mental hospital, even should he lose interest in pathology, he will still be in a position to instruct his resident medical officers in their turn and know what sort of an examination to expect from them or the head laboratory workers. From this it is apparent that apart from any work (perhaps of a high order) that may be done by the enthusiast, we must expect every resident medi-

cal officer to be able to carry out blood counts, cerebro-spinal fluid examinations, vaccine administrations, blood sugar and urea estimations, the common bacteriological methods, including the taking of throat swabs, of material from discharges and evacuations for vaccines and the preparation of suitably stained sections of interesting tissue or when a hurried diagnosis is required, the ability to select and collect material from interesting neurological sources for our museum.

The candidate's course of instruction further includes series of epidioscope lectures on the pathology of the various forms of mental disease, such as is commonly accepted, diagrams being provided from illustrations in current literature and text books, as well as lantern demonstrations of microscopical slides of the so-called system diseases and trauma states of the spinal cord and brain stem prepared by suitable mordants and stains and impregnations. Access is given to trays of slides culled from preparations from routine work in the laboratory accompanied by keys in the form of typewritten descriptions including, where possible, the history and gross specimens.

Special care is taken that the candidate has expert knowledge of the use of the microscope, including dark ground examination of spirochaetes and tissue cells. When possible individual typewritten sheets of special lectures on the special subject are made available to save the student's time and to make for clarity.

He performs the Bordet-Wassermann tests himself if only to learn the necessity of collecting and forwarding specimens cleanly and expeditiously and tests the varying agglutinating phenomena. The various uses of the colorimeter and nephelometer and their comparison with titration methods by normal solutions is shown and various estimations in association with carbon dioxide content of blood serum or alveolar air are performed and rendered familiar and the whole course correlated with the work done in the departments of anatomy and physiology to prevent overlapping and to secure continuity of thought.

#### The Uses of the Central Laboratory of the Mental Hospitals.

No more excellent account of the multifarious investigations which can be carried out in and under the control of such an institution, can be readily obtained than that to be found in the latest report of the Board of Control for 1926. The special annual report of the pathologist-in-chief for his central laboratory is followed by those of the respective pathologists in the various mental hospitals and it will perhaps suffice if I indicate on what lines my own laboratory is run.

I have already indicated that it is the connecting link between the mental hospitals and the University as regards the diploma course in psychological medicine. The increasing importance of the early diagnosis of general paralysis of the insane necessitates the performance by us of some 2,050 Bordet-Wassermann tests as well as the examination of

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some 140 specimens of cerebro-spinal fluids by the goldsol and our other routine tests annually.

The malarial treatment of this disease by living organisms demands expert knowledge of the hæmatology of this disease, so that the faintest indications of a mixed infection may be recognized. I have had experience of patients in whom the previous administration of quinine has concealed for weeks after the withdrawal of the quinine all signs of the malignant parasite in the blood stream, while the benign tertian variety seemed unaffected, being present in great numbers. The benign parasite is accompanied by its own blood picture and clinical signs and these obscure the signs indicative of an infection with other types. The most experienced parasitologists have thus been deceived. Again in Australia greater care must be taken to recognize the complete absence of any parasite after the course is finished, before the patient is allowed out among his companions, much less into the outer world.

The ravages of *encephalitis lethargica* so clearly exposed by the Melbourne physicians at the last medical congress, call for expert knowledge of its pathology. Patients continually come into mental hospitals with the diagnosis of general paralysis of the insane or acute confusional insanity or even hysteria or other psychosis and some die. Doubts arise in the minds of medical superintendents about the dementia being paralytic and we are asked to adjudicate. Sudden deaths in country hospitals from the same disease, but presenting the most confused clinical phenomena, also call for help.

The laboratory worker should be prepared to conduct examinations of neurological material from the general hospitals and wonderful material has thus come to light, greatly increasing the richness of our demonstration material as well as the pleasure derived from working up material for neurologists of world-wide fame.

From time to time pathologists and their assistants from other hospitals and States come to us for studies of special technique and to exchange views to our mutual benefit. Another form of research is the examination of the nervous system for changes resulting from various forms of poisoning. The late Dr. Mott was so engaged over the action of "Veronal" on nerve cells when he died and our late chief, Dr. Froude Flashman, conducted animal experiments with toxic substances which had proved fatal to various patients with the idea of elucidating the mode of action and in two instances with valuable results.

The main responsibility of keeping the whole mental population of our State regularly inoculated every three years with antityphoid vaccine also pertains to the central laboratory, as well as investigations in the past to various outbreaks of dysentery and typhoid. On three occasions carriers were isolated, including one by ourselves. In *The Lancet* of August 21, 1926, will be found an account setting forth how in the fifteen years preceding 1915, among some 5,000 annual population patients and staff in our mental hospitals, there were recorded some 241 cases of typhoid, while in the post inoculation period of

1915 to 1924 inclusive, when the annual average population has risen to 8,000 or more, there occurred but 12 cases of typhoid altogether and only two among the inoculated. I must add that during this period the activities of the New South Wales Department of Health had reduced the State incidence of typhoid from thirty to four cases per 10,000 inhabitants.

The increased interest evinced by some of our officers in epilepsy demanded an examination of the ductless glands of well over one hundred persons, which meant preparing slides from the liver, pancreas, suprarenal, thyroid, thymus, pineal, pituitary and gonads and spleen. It can be readily understood to what a degree such concrete examinations advance a live interest in this distressing complaint. It was associated with the exhibition of calcium and various gland extracts with unexpectedly good results in some of the younger patients. In other cases they were undertaken to prove or disprove some diagnosis of glandular dystrophy; some of these have been published. Some observations of Dr. Prior on the young of goitrous sows confirm McCarrison's work on the importance of the endocrines of the pregnant mother on the infant's vitality and normality.

The highly enlightening results to be obtained by the proper coordinating examinations and researches on numerous *post mortem* findings among the insane is well evidenced by the excellent material published by Dr. Lind, Pathologist to the Victorian Department of Mental Hospitals, whose results cover a wide field of inquiry, not only on hereditary defects, but also on that little known condition, *tuberosa sclérose* as well as on epilepsy.

Not only are the ideals of our American colleague, Cotton, thus honoured, but also the principles of Almroth Wright. Each year more advantage is taken of the laboratory for vaccines, chiefly autogenous, and various sera and material for protein shock; at a few hospitals men have undertaken protein sensibility tests partly for treatment and partly for diagnosis and research.

Investigations into some of the blood constituents by the methods of Folin and Wu were I believe first undertaken south of the line in our laboratory and formed the foundation for such work in the general hospitals. The laboratory is also responsible for supplying rare or expensive reagents and for the safe keeping and efficient working of all microscopes and expensive instruments in mental hospitals. Thus experiments were carried out on the carbon dioxide content of alveolar air and serum in various types of the psychoses. Thanks to the work of an old colleague, Dr. Egerton Grey, now of London, colloidal gold solutions can be simply made up in a few minutes, of excellent quality. Tests have been made with many specimens of cerebro-spinal fluid with this reagent.

The great interest taken in recent years in the anatomy and functions of the sympathetic and autonomic systems did not leave us undisturbed and some of the histological part of Hunter and Royle's work was carried out in our laboratory. One of the most interesting outcomes of this work is the



suggestion put forth on many sides that either of these systems are involved in many clinical states whose pathology needed unravelling. Among these are certain forms of atrophy and fibrosis associated with skin and muscle, nerve and vascular system, such as the dystrophies, scleroderma and perhaps certain atrophic states of the brain and cord, such as is found in some of the compression myelitides and the so-called combined sclerosis. It is to be hoped that technique both operative and microscopical will be evolved, so that pathological states of these systems will be recognized as a matter of course. We know far too little of the normal and morbid structures comprising the sympathetic system. My colleagues, Professor Burkitt and Dr. Wilkinson, of the Anatomy Department, demonstrating sympathetic nerve endings on fat cells by the *intra vitam* methylene blue method, have shown the terminal filaments to be so thin that, though of considerable length and complexity, the finest adjustments of the microscope were necessary to render them visible. Thus it seems fair to postulate that quite soon we should have at least normal pictures of these endings in every tissue and then when pathological records have also been achieved, it may be possible to correlate pathological findings with disordered functioning.

Progress in mental pathology must include the attention being given to the basal nuclei, not only in encephalitis, because of the sequelæ of Parkinsonian syndromes, certain emotional states and occasional nutritional phenomena, but also in disseminated sclerosis which commonly affects the cord and stem at least to a relatively larger extent than the cortex and therefore might be assumed at times to give rise to clinical signs on a par with *encephalitis lethargica*. This has been shown to be so, recent observers having noted an emotional syndrome as one of the earliest signs of this disease, which has a pathology resembling a chronic infection and in which the spinal fluid may yield a typical parietic curve. In this disease we have long known that clinical and presumably histological signs may abate over long periods. Now in a crowd of well established general paralytics one can assume that the majority will have well established histopathological lesions showing evidence of the active infective agent being still at work. The same will hold true of many cases of *encephalitis lethargica* as regards its cerebritis.

*Post mortem* examinations on persons cured of general paralysis of the insane by the malaria treatment, but dead of some intercurrent disease, show unmistakingly that the clinical cure was accompanied by an histological cure as evidenced by the disappearance of neuroglia cells, perivascular infiltration and neurophagia.

This fact has appealed to me as one of the most hopeful for our outlook on the possibility of cure in this class of nervous affection. Hitherto cure seemed hardly possible in view of the histological picture revealing as it did in general paralysis of the insane and the others mentioned such widespread and dense sclerosis and glial proliferation, vascular degeneration and neuronie atrophy. Many of these

neurones can scarcely be replaced, but practical experience of lesions of the central nervous system reveals to us that excellent function can be obtained even with the permanent loss of many neurones.

The recent report of a cure of a case of almost fulminating leprosy by a mixed vaccine of leprosy bacilli and those of *pyocyaneus* is a case in point for many nerves were involved and large nodules had to be resolved by the activations of the body's defences.

Again Wilson's disease which he showed to be one of involvement of the lenticular nuclei and liver with imbecility, has now been shown to have its primary lesion in the liver and if substantiated this would add credit to Crile's experiments and conclusions on the importance of the liver action with brain cell vitality and function. Sundry writers have done good service by demonstrating the essential differences between Little's congenital disease and the condition of torn *tentorii cerebelli* and similar birth injuries often diagnosed by lumbar puncture.

Marinesco would have the ultra-microscope show us that in amyotrophic lateral sclerosis the spinal nerve cells exhibit initial changes in their colloid media brought about by the action of intracellular ferments.

Tissue culture in approved media has reached a high degree of certainty, not only in regard to new growths, but also to the developing neurone itself, which appears sensitive to minute electric currents, showing polarity. The gliomata have been further studied by Bailey and Cushing and chiefly by new methods of staining and impregnation have been further classified so that with some types of glia cells long years of postoperative life can be assured and operative measures should be tried as legitimate procedures. Sargent, too, from the operative side gives numerous experiences of intracranial tumours, discusses their prognosis both as regard type of cell and position. Cerebellar tumours may be less malignant tending to degenerate into cysts than corresponding tumours of the cerebrum. This helps us to understand the origin of collapsed cysts from the cerebellum sent in for diagnosis. He also draws attention to varieties of angiomas of the cord and brain, dangerous because of their tendency to rupture and also to become more cellular and to infiltrate.

Gordon Holmes and Dott have increased our knowledge of the pathological disorders of the pituitary region and have elaborated alternate views on the importance of the stalk and hypothalamus. By some it is maintained that here is situated a bilateral centre for nutrition at least as regards fat, a higher centre for the trophic nerves.

More extensive work on the cerebro-spinal fluid with view to extracting every possible diagnostic help includes "chromoneuroscopy" or the permeability of the chorioid plexus to drugs or dyes in meningitis and so forth. Yet another theory, quite suggestive, has been given to us by Trotter to account for the cerebro-spinal fluid as secreted by the chorioid plexus. It is that it is secreted to dilute the fluid reaching the pia-arachnoid and



thus ultimately the circulation from the perivascular spaces of the cortex; replete with the poisonous products of neural metabolism, the latter were otherwise too concentrated and deleterious.

Increasing knowledge of the values of the several vitamins and the pathological states dependent thereon and experiments therewith on rats should influence our work with the insane and on such grounds the pathologist should find himself in intimate association with the patients and their surroundings and with the medical and supervising staff. His ken should include the numerous septic tank installations, so often defectively looked after. Obscure diseases figure constantly in medical literature; they will certainly be found among the depressed or those whose trophic functions are weakened and among foreigners, like beri beri among Chinese patients. In the United States of America Bureau of Health in Manila I was shown a concentrated essence of anti-beri-beri extract for extremely acute cases in nursing infants.

We do not know all that is to be known about states of nutrition. Therefore new conceptions as to possible causes of strange neurological lesions must be looked for. Trotter has given us a lead when he maintained that neural tissue is extremely antagonistic to any other, such as mesoblast. These ideas he derived from his observations on the ready separation between the *dura mater* and scalp after operations and dural tumours and brain substance. This antagonism has been made use of by him to explain the nodules in von Recklinghausen's disease as a brisk reaction of mesoblast to naked axis cylinders, which have been insufficiently held in restraint owing to the neurilemma being congenitally defective. Thus step by step individual problems in neurological pathology slowly permit themselves to be revealed.

The duties of the neuro-pathologist are to aid the psychiatrist in his problems, to help the psychologist to realize how much mental function depends on neuronic activity by provision of as many clearly defined pathological specimens as possible, associated with histories accurately recording the mental states associated therewith. At the same time the conception of a mental trauma is conceded, though it is accorded the second place. Finally he must keep his own mentality keen by personal association with his patients, by personal activities in research work and by an untiring acquaintance with recent literature, embodying the impressions of his fellow workers the world over.

#### SOME PHYSICAL CAUSES OF MENTAL DISORDERS.

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AND

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It is not our intention in this brief paper to enter into all possible physiogenic causes of mental diseases, but rather to limit our remarks to those

physical causes of which we have personal experience, and these are mainly chronic infections and endocrine disorders.

That any physical illness affects the mind has long been recognized, such as the hopeful outlook of the patient with pulmonary tuberculosis, the undue anxiety attendant upon disease or failure of function of the genital organs, leading often to extreme melancholia, the apathy and depression associated with athyreoid conditions and the liveliness and sense of well being accompanying hyperthyreoid states, liver and intestinal disorders being accompanied with dulness and depression. Any physical illness that brings any alteration to the nerve cells themselves, such as injuries to the head or new growths within the cranial cavity or those changes in the blood composition as found in acute fever and infectious diseases and in diseases of the liver or kidneys, in fact any dysfunction of any excretory or secretory organs, ductless or otherwise, will to a greater or less extent affect his sense of well being and his capacity for cerebral activity.

Not only will alterations in physiological and metabolic processes affect the mind, but a number of drugs of which the best examples are alcohol, opium and cocaine, will also greatly influence mentality and many normal persons' thinking and working capacity will undergo changes under such entirely outside influences as changes in weather or climate, but probably not with the much credited changes in the moon.

Cotton and Ford Robertson have led the way by pointing out the vast influence of physical defects in causing various forms of mental disease and how to cure the mental illness by removing the physical cause.

Cannon has recorded how the brain for its effectual functioning is dependent upon the integrity of other organs, more especially the liver and adrenals, and how dysfunction of these organs will affect the brain.

McCarrison has demonstrated the changes in the cortical neurones in athyreoidism and how these again change with renewed activity of the thyroids.

Cotton whose work upon infections and insanity is thorough and whose hospital is evidently equipped in a remarkable way, searches for infection from the air sinuses of the skull to the organs of the pelvis and treats accordingly.

Our own experience is much more limited and, we regret, much less thorough, but still containing a proportion of good results.

The infections with which we have dealt, have been of the teeth, urinary and intestinal tracts.

We have had two cases where the extraction of septic teeth have brought about an immediate improvement in the patient's condition with an ultimate recovery and discharge. The first was that of a young girl, aged seventeen years, in an acute maniacal condition, resistive, restless and sleepless and quite incapable of any concentration. Her teeth were carious, her gums receding and discharging pus. There was distinct improvement within forty-eight hours of her teeth being extracted; she was able to sleep, became less restless

and was able to fix her attention. Her improvement was continuous and uninterrupted and she was discharged within three months of her operation, during which time she put on 6.3 kilograms (a stone) in weight.

The other was that of an older woman, aged forty-two years, extremely depressed, almost silent, often refusing food and having to be tube fed. Her teeth, although not affected to the extreme degree as in the first patient, were nevertheless septic and the lower gums were spongy and discharging pus. The benefit upon the mental condition of removing the teeth was very evident; she became more interested in life and took her food, but there remained a despondent outlook and an uncommunicativeness and her cure was not complete until she had had a course of vaccine treatment, the vaccine being prepared from a *Bacillus coli communis* found in the urine. She was later discharged perfectly well.

Many patients, more especially we think of the acute melancholic type, have septic teeth; none of these are improved until their mouths have been cleaned. In a number of these we have isolated organisms from the urine.

We have had several cases of urinary infections, mostly some strain of *Bacillus coli communis* cases of wide variety, occurring in patients of different ages who have made complete recovery after a course of vaccine prepared from their own bacteria.

We would strongly emphasize the great importance of routine examination of the urine for organisms in all except perhaps the senile and persons with organic forms of insanity. The number of good results is surprising and these patients very often manifest no symptoms pointing to urinary infection.

Ford Robertson points out the common association of *Bacillus coli communis* infections and mental disorders and asserts that the toxins from these organisms are extremely toxic to the nerve cells. In some patients in whom no definite infection has been found it has failed, in others we have had success with faecal vaccine.

All our vaccines have been prepared in Dr. Oliver Latham's laboratory and the faecal ones are prepared as suggested by Watson, who has had considerable success with this method of treatment. With vaccines prepared either from bacilli or cocci grown either from urine or faeces, we have treated thirty-two patients with recovery in eighteen. Of these totals twenty-one were females with nine recoveries and eleven males with nine recoveries.

Of the twenty-one female patients twelve were treated with vaccines prepared from urinary growths, of whom five recovered, and nine with vaccines from faecal specimens and four of these recovered and two were greatly improved. Of the eleven men, eight were treated with vaccines from faecal specimens with six recoveries and three were treated with urinary vaccines with two recoveries.

As showing the influence of septic infection upon the mental stability, we would instance the case of a man admitted twice within two years in a condition of acute mania. On each occasion his mania

was accompanied by an attack of gonorrhœa and the mental symptoms each time subsided with the treatment of the gonorrhœal discharge. He was a single man, happy and free from cares and an attack of gonorrhœa would not affect his mentality.

Another case was that of a lad of fourteen years admitted also in an acute maniacal condition which resisted all treatment. The boy was given an autogenous faecal vaccine, when the symptoms rapidly cleared and he was shortly afterwards discharged. He remained well and was not heard of for eighteen months, when he was again admitted in a maniacal state. This time he had a crop of boils around the right suprascapular region. He recovered within a few weeks, the treatment adopted being that for the boils.

In both of these cases the mania was associated with an acute infection, a common infection incapable in ordinary individuals of causing more than a local disorder and perhaps a general discomfort. Complete recovery followed the removal of the septic source in these four attacks.

Twelve of the patients treated with faecal vaccines were suffering from adolescent psychoses and conditions of acute confusion or mania and these as a class did remarkably well, all but two recovering; on being discharged they were capable of taking their place in the world. Three of these have returned to the hospital with a second acute attack, one the boy above referred to as having the suppurative condition as the cause of his illness. Another was a girl, aged twelve years at the time of her first attack; she returned two years later in a similar attack and quickly recovered with another course of vaccine. She was much neglected in her home life and had a drunken mother. The third case was that of a boy, aged fourteen at the time of his first attack; he had his second two and a half years later. This lad had to face the world mostly unaided and worked upon dairy farms. He is at present under treatment for the second attack.

Two patients with urinary *Bacillus coli communis* infections made complete and surprising recoveries. Both were transferred from other hospitals acutely ill and despaired of and in neither was the infection suspected and it was only by routine examination that it was found.

One was a girl, aged twenty-three years, whose mother is insane. She was extremely emaciated, depressed, refusing food, incapable of any rational conversation, quite indifferent to her surroundings and of faulty habits. On treatment of her bacillary infection the improvement was rapid and complete, she put on 12.6 kilograms (two stone) in weight and became a lively, happy and pretty girl.

The other was a patient, aged thirty-seven years, who had been much in the hands of the surgeon, her last operation six months before admission being for some gall bladder trouble. On admission she was thin, very depressed and troublesome with food and was almost silent. Her recovery was as complete as that of the previous patient and the improvement in her personal appearance as great.

Two lads, one of fifteen and one of sixteen years, completely recovered after vaccine treatment. The

first was acutely maniacal with delusions of grandeur and riches, from whose urine a *Bacillus coli communis* was isolated; he lost all his restlessness and delusions while receiving the vaccine. The elder boy was extremely depressed with a tendency to catalepsy. He was treated with autogenous fecal vaccine. This was commenced five months after his admission during which time he had become worse rather than better. In addition to the vaccine he received the low grade antidiphtheritic serum. While under treatment he put on seventeen kilograms (two stone ten pounds) in weight and was shortly after discharged, a completely changed lad.

F.G. was admitted in a dull, disinterested, disoriented condition. He was quite irresponsible and faulty in habits. A Gram-negative bacillus was isolated from his urine and a vaccine prepared. He made an uninterrupted rapid recovery.

E.C., aged fifty-eight, was admitted in a depressed delusional state. Her delusions were unsystematized, varied and bizarre. She took very little interest in herself or her environment and at times was resistive. She suffered from frequency of micturition, scalding and excessive acidity and microscopic examination revealed pus and a Gram-negative bacillus. Under treatment with medicine and vaccine she made a rapid recovery, mentally and physically.

V.G., a lad, aged six years, was reported as a bright boy, but had been subject to *petit mal* and *grand mal* for some twelve months previous to coming under observation. On examination he was also noticed to have twitchings of the face and had scalding and frequency of micturition. His urinary examination revealed crowds of *Bacilli coli communis*; a culture was made and vaccine prepared. Treatment with urinary antiseptics and vaccine caused a disappearance of his urinary symptoms, twitchings and a lessening of fits.

We gave fecal vaccine to four epileptics more to observe events than with any great expectations of results. In three the treatment made no difference. In another there was no difference in the frequency or severity of the attacks, but this patient for years had suffered from chronic constipation and had to take aperients almost daily. She stated that after the course of vaccine, her bowels acted regularly and she was able to discontinue the habit of taking aperient medicine.

Another class of case in which the mental symptoms seem to depend wholly upon a physical disturbance, is that with endocrine dysfunctions. This is probably a much larger class than generally recognized, the diagnosis at times being difficult, as the signs and symptoms are often confused and contradictory, which renders appropriate treatment more difficult than the diagnosis, but when the proper treatment can be foretold, the results are brilliant.

A lady, aged forty-seven years, was admitted in an extremely depressed condition. Some nine months before admission her husband was accidentally poisoned. This caused great depression and a sudden cessation of menstruation. On admission she was extremely depressed and emotional,

constantly weeping and insisting that she was a freak and was much troubled with dreams that so frightened her that she was afraid to sleep. She had been in this condition for several months. On the physical side she had lost much weight, but otherwise showed symptoms of mild athyreoidism. Her eyebrows were deficient, hair of head dry, skin dry, pulse slow and there had been a sudden and complete amenorrhœa. On "Varium" (one gramme) and thyreoid (three centigrammes) daily she made an absolutely recovery, being discharged quite well within six weeks of the commencement of treatment. This was a case of shock, followed by suspension of the thyreoid and ovarian functions and extreme mental depression, the mental symptoms immediately clearing upon restoration of the glandular activity.

A young lady, aged thirty years, a doctor's secretary, had been ill for some ten months before coming under observation. She was extremely agitated, obsessional, depressed and miserable. Physically she had symptoms of hyperthyreoidism, moderate exophthalmos, a quick pulse, tremor, flushing of skin, excessive activity of sweat glands and profuse menstruation. She was confined to bed, given whole gland pituitary and "Tricalcine." In less than a month she was bright, interested in life, doing useful work and was discharged in as good a mental and physical health as she had ever been.

A lad, aged eleven years, was 140 centimetres (four feet seven and a quarter inches) in height, 37.75 kilograms (four stone five pounds) in weight, undersized with slender bone, dark heavy eyebrows, rather much hair on face and body covered with fine hair. His thymus gland was enlarged. His blood pressure was 80 millimetres of mercury. He was admitted two days after having had his tonsils removed under an anæsthetic, of which he had much fear. On the evening of the operation he awakened in great terror saying that he was about to die and his heart was stopping. He was admitted next morning in a condition of the most abject fear, constantly crying out: "I am done!" He would insist that his heart was about to stop, that his hands and feet were cold. If he slept, he would awaken, screaming with fright. His make-up was not normal; his mother had died suddenly of heart disease while the children were alone with her (from which he had probably got the idea of his "heart stopping" and the "cold hands and feet"). He had a brother and sister in a mental hospital. He himself was a smart lad and although only eleven years of age had passed his qualifying certificate examination. It was thought that the fright of the operation and anæsthetic had exhausted an already not too active suprarenal. He was given 0.06 mil (minim) doses of adrenalin and suprarenal extract, after which his improvement was almost immediate. He at once lost his night terrors and within a few days his other fears.

As an instance of a mixed glandular dystrophy and chronic infection may be mentioned a boy, aged sixteen years, weighing thirty-six kilograms (five stone ten pounds). On admission he was much



distressed, saying that there was nothing wrong with his sex and he had vague delusions of persecution. He was small and undeveloped, his genital organs were infantile and he was devoid of secondary sex characters. His thymus gland was enlarged and the skin of hands and feet were mottled and bluish. As a stimulus to sexual and physical growth he was given anterior pituitary and thyroid extract, but for some months he remained in a quiescent condition. He was then in addition given an autogenous faecal vaccine. He then made more rapid progress, his primary sex characters developed to their normal size, he became bright, lost his delusions and when he left the hospital seven months after admission had put on 11.75 kilograms (twenty-six pounds) in weight.

F.D., aged thirty-four years, was admitted to hospital in June, 1923. He had been a sailor and came from America to Sydney. Here he probably deserted, as for six months before admission he had been leading the life of a vagrant. He was in a very low asthenic condition, very dull and apathetic, would lie in bed with his head covered and if roused, would become resistive and abusive. He was a man of one hundred and seventy-five centimetres (five feet ten inches) in height and he weighed sixty-three kilograms (ten stone).

He appeared ill and was very irritable, would pass urine and faeces in bed, was capable of rational conversation, but greatly resented being disturbed to answer questions. His skin was dry and scaly, more especially on the hands and face. The hair of the head was scanty, dry and thin, there was very little hair on the face, pubes and axillae and there was no hair growth on the body; the hair of the eyebrows was very deficient. He complained bitterly of the cold. There was no dermatographic reaction. The right eye was directed outwards, the right pupil was dilated and immobile, the left pupil contracted and immobile. The left *fundus oculi* showed blurring of the disc on the nasal side; in the right eye cupping of the disc on the nasal side was present. There was ptosis of the right upper lid. The thyroid could not be felt nor could the thymus be percussed. The liver dulness was normal. The testicles were very small. His heart sounds were faint, pulse small and systolic blood pressure only seventy-five millimetres of mercury. For three weeks there had been intermittent vomiting. The knee jerks were exaggerated, as were the plantar reflexes and there was right ankle clonus. Babinski's reflex was not present. The patient admitted having had syphilis and gonorrhoea. His extremely dull and apathetic condition, together with the condition of the hair and skin and the extreme susceptibility to cold suggested a thyroid condition. The low blood pressure and vomiting indicated a suprarenal dystrophy, while the testicles were obviously atrophied and this might have had an influence upon the activity of either of the other glands.

The patient was first treated with thyroid extract 0.06 gramme and suprarenal gland extract 0.6 gramme daily. With this treatment he made con-

siderable improvement, he became more active and less taciturn.

As a reaction was obtained in his serum to the Wassermann test he was given antisyphilitic treatment from July 14 to October 3, 1922. The serum then failed to react to the Wassermann test. By this time he was active, strong and well, the eyes had become normal, the squint and ptosis had disappeared, the pupils were active and normal and the fundi were reported to be normal. His improvement was maintained and he was discharged as having recovered after six months' residence.

It would seem that in this case both the thyroid and the suprarenal glands were affected. His nerve lesions were clearly syphilitic and it is highly probable that the glandular affections were also of this nature.

#### THE "COMPOSITE" VIEW POINT AS TO THE CAUSATION OF MENTAL DISORDER, WITH PARTICULAR REFERENCE TO SEPSIS AND ENDOCRINE DERANGEMENT

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THERE should be two essential attributes in the armoury of every would-be scientist; first steadfastness of purpose and secondly absence of dogmatism, which signifies the faculty of being able to change one's mind when necessary. Nowhere are these faculties more necessary than in psychiatry in general or the subject of this discussion in particular, because it is one which may be regarded from so many angles. Mental disease can be attributed to widely differing causes and the leaders of each school of thought are so very assertive on the matter that there is an excuse if occasionally the pupil loses a sense of proportion.

The various causes may be represented diagrammatically as in Figure I.

To be perfectly candid most of these dogmas have fascinated me, though this little paper is an account of my own conversions chiefly, in connexion with Nos. 6 and 7, which have led to the composite view point No. 8.

It was in 1921 that Dr. H. A. Cotton<sup>(1)</sup> gave his Vanuxem lectures in which he stated that 70% of the patients admitted including those suffering from manias, melancholias, depressions and the more chronic types known as *dementia præcox* and the psycho-neuroses, were cured by a process of detoxication. Subsequently these figures were improved upon and it only remained for the psychiatrist to hire a surgeon in order to empty his hospital!

As we know the results have been severely criticized and in the main they are far from being universally accepted. Shortly after reading one of Dr. Cotton's papers, as luck would have it, I had a run of cases which seemed to confirm his thesis.

Two adolescents and a man in the twenties exhibiting excitement and schizophrenic trends reacted to rectal irrigation in no uncertain fashion.



They received daily double high enemata, their symptoms subsided and when the douches were discontinued, a relapse occurred.

They ultimately recovered and have as far as I know not again had a relapse. However, it was obvious that in addition to the use of high enemata as advocated by Dr. Chalmers Watson,<sup>(2)</sup> I had freely employed suggestion; I had given a psychological examination, had to a certain extent readjusted their psychic make-up and advised them as to subsequent action. Wishing to make further tests in which these additional factors were excluded, I obtained Dr. J. A. L. Wallace's permission to give some twenty-five patients of both sexes with *dementia præcox* all of whom had been admitted for less than a year at Callan Park, precisely similar Plombière douching for a month. In order to obviate suggestion I personally had no personal contact with them. The result was disappointing, since there was absolutely no change in the mental condition.

Secondly, Dr. Latham kindly made up for me faecal vaccines for some fifteen patients and though I persevered in their injection, I was quite unable to persuade myself as to any efficacy.

The disciples of "Cottonism" would aver that I had not eradicated tonsillar trouble, gastric disorder, colonic toxica-tion by surgical procedure, so I am not in a position to draw deductions, but surely one would expect to find that even with irrigation there would have been a slight amelioration of symptoms, if not cure. Moreover, though I invariably look for dental sepsis and "wage war to the forcep" on dead teeth and crowns, it is rarely that I notice a dramatic result of their removal. It is extraordinary, too, how the majority of presumably sane individuals can and often do support these abominations with impunity!

A fair quantity of indican in the urine is a frequent finding in newly admitted patients, which would point to intestinal stasis; if this were causal, its removal should have far-reaching results. Unfortunately this is far from being the case.

Although only one out of sixty male attendants at Callan Park had indicanuria (these were taken as a control), indican was present in varying amounts in the urine of no less than 31% of a large series of newly admitted patients.

Likewise in a series of one hundred fractional test meals, I<sup>(3)</sup> have confirmed Cotton's statement that hypoacidity is common in mental states. The ex-

hibition of large doses of hydrochloric acid, which should at least check the inroads of offending microbes, in my hands has had disappointing results. It is known incidentally that achlorhydria may be associated with good health.

Interest in endocrinology began to wax fat at the expense of sepsis, for when correlating my clinical findings, I noticed that no less than 40% in one series showed signs of hypothyroidism. Moreover, it is common knowledge and to my mind an extraordinarily though provoking fact that whereas the outside practitioner dabbles in fractional doses of thyroid extract, our psychotics can take many grammes daily without apparent effect.

My attention was again drawn to the thyroid gland, when on investigating with Dr. H. M. North<sup>(4)</sup> the relationship between arteriosclerosis and mental disease, I found that there seemed to be an undue proportion of minor hypothyroids as shown by tolerance to the extract, Hertoghe's eyebrow sign, coarseness of the skin, malar flush, slow pulse and so forth.

A little later in a research on gastric function already mentioned, I noticed the ubiquitous thyroid was again in evidence, hypothyroidism and hypochlorhydria in many cases running parallel. This was to a certain extent confirmed by animal experiment, in that in one rabbit extirpation of the thyroid gland produced a tendency to absence of free hydrochloric acid. Since the first

flush of gastric juice is brought about by the action of the vagus, it is suggested that the deficiency might be vagal in origin. A central rather than peripheral disturbance seemed likely because the exhibition of thyroid extract by the stomach made no difference to the flow of acid secretion.

An idea thereon germinated, resulting in a hypothesis that thyroid secretion is necessary for the proper functioning of the vagal nucleus. One might call this a thyreo-vagal balance theory. Reading the literature I found that indefatigable worker, the late Sir Frederick Mott,<sup>(5)</sup> had forestalled me by publishing in 1915 an account of the possibility of just such a relationship from the pathological side. He described universal chromatolytic changes in cells of the central nervous system, especially smaller cells of the autonomic nuclei, for example vagus and glossopharyngeal in three cases of hypothyroidism.

Turning to another organ, I have for some time been engaged in a research on the site of the emotions and other components of consciousness. The

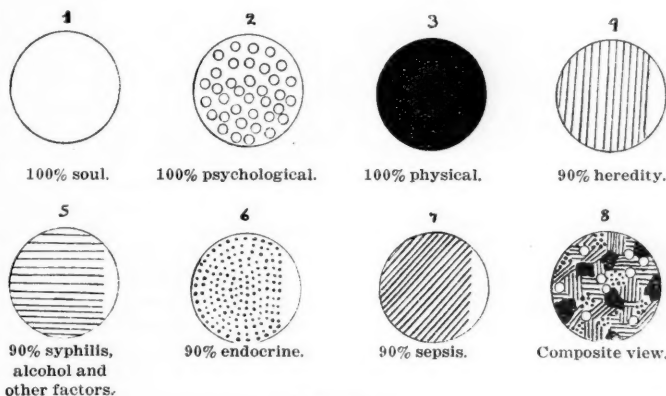


FIGURE I.  
The Rival Dogmas Concerning Mental Disorder.

result is as yet unpublished, but sufficient evidence has been accumulated to point to the important conclusion that emotion is based on cells for pain, heat and cold, which are situated in the optic thalamus. The connexion between the emotions and the whole vegetative system is, of course, very well known, also that in some anxiety states the thyroid gland seems to be directly involved. Again sallying into hypothesis, may it not be supposed that the thyreo-vagal balance is more complicated than it looks and there is a thalamo-thyreo-vagal balance?

This is drawn schematically in Figure II.

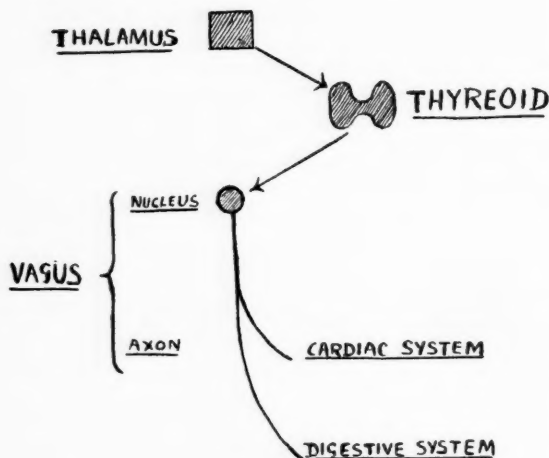


FIGURE II.  
Thalamo-Thyreo-Vagal Balance.

It must be noted that this diagram is expressly made simple—*exempli gratia* the inclusion of the sympathetic would be compatible with the thesis but is not now under discussion.

Such a conception would account for the fact that in an individual psychosis there may be at the same time: (i) Changes in the emotions, thyroid gland, digestive system, circulatory system, (ii) obscure reaction to thyroid administration owing to variety of factors involved, (iii) presence of sepsis owing to change in the digestive system, presence of indicanuria and intestinal stasis.

It does not give a reason for the very puzzling fact that in some animals extirpation of the thyroid gland may have no appreciable result, but on the other hand this is probably not true of man.

There is justification I consider in bringing forward in a brief and therefore necessarily sketchy fashion these conclusions in a discussion on the relationship of sepsis and endocrinology to mental disorder. They explain my present standpoint as to causation, which is depicted in Figure I, No. 8. It will be seen to be a very "futuristic," piebald diagram, a thing of streaks, rings, dots, shadings of black and white. It has not the austere simplicity of its forerunners, but is more complex. A detractor might call it a mish-mash, a *pot pourri* and so it is, but surely if such be the ways of truth, adoption should follow even if it spells the end of certain convenient dogmas, to wit that we can regard mental disorder as 100% psychological, 100% physical,

90% sepsis, 90% endocrine *et cetera*. Instead we realize the greatness of psychiatry in that no single factor can be ignored from psychology to physiology and anatomy to sepsis and endocrine disorder. No longer is the stage set for the portrayal of a small problem play, but for a mixture of comedy and drama whose theme is the whole history of man.

To return to the particular, a case cannot be simply pushed both for classification and treatment into a cast-iron compartment to which the name melancholia, *dementia præcox* is given, but becomes a syndrome, no two of which are exactly alike; there will be V psychic involvement, W physiological, X pathological, Y endocrine and Z septic charges and so forth. Treatment will be dependent upon a proper evaluation of each component which must be carefully analysed. Immense research will have to take place before we are able to do this at all adequately, but it is the conception of the future and time will bring it to pass.

This is by no means an original thought for it is as old as the hills, as I have already pointed out under the caption "Vicious Circles in the Psychoses."<sup>(6)</sup> In his Presidential address (1926) Dr. J. R. Lord,<sup>(7)</sup> of the Royal Medico-Psychological Association, has summed up the matter admirably by saying that "the one man treatment of mental disorders has been found wanting, something more is required, team work."

The only economical way to do this is to let our hospitals for chronic mental disease be run by a skeleton medical staff and mass our forces at the admission hospitals. The logical conclusion to a theory that every known medical and sociological principle is involved in the causation of mental disease, is that all the experts in their use must be at the call of the patient in his acute illness. This is the truly psychological moment.

I have deliberately introduced this topic, in order to show by a concrete example how a few small incursions in research bring us to a realization of the stone wall fact, namely that the simplest problems of our speciality require inquiry along half a dozen lines for their interpretation.

So far I have evaded the difficulty of assessing the precise amount of villainy attributable to toxin, hormone, psyche or physical entity by belittling them all. Mathematical precision is, of course, unfortunately, impossible, betting should be taboo; an impression is, however, legitimate and this in spite of an old love for pathology gives the palm of roguery to the psyche.

It is not, however, aberrant infantile sexualities which are at fault, but later sociological embarrassments. These upset the psychosomatic equilibrium, resulting in that disordered function, which leading to such frequent sepsis and endocrine disorder is the *raison d'être* for the present discussion.

#### Acknowledgments.

I am indebted to Dr. J. A. L. Wallace, Medical Superintendent of the Mental Hospital, Callan Park, for permission to use the clinical material which has formed the basis of this paper, and to Dr.

C. A. Hogg, Inspector-General of Mental Hospitals, New South Wales, for consent to publish.

#### References.

- (<sup>1</sup>) H. A. Cotton: "The Defective Delinquent and Insane," Princeton University Press, 1921.
- (<sup>2</sup>) C. Watson: "The Role of Auto-intoxication or Auto-infection in Mental Disorders," *Journal of Mental Science*, 1923, page 62.
- (<sup>3</sup>) J. Bostock: "Digestion and Mental Disease," *THE MEDICAL JOURNAL OF AUSTRALIA*, May 8, 1926, page 510.
- (<sup>4</sup>) H. M. North and J. Bostock: "Arterio-Sclerosis and Mental Disease," *THE MEDICAL JOURNAL OF AUSTRALIA*, February 14, 1925, page 156.
- (<sup>5</sup>) F. W. Mott: "Microscopic Examination of the Central Nervous System in Three Cases of Spontaneous Hypothyroidism," *Proceedings of the Royal Society of Medicine*, Volume VIII, Section of Psychiatry, 1915.
- (<sup>6</sup>) J. Bostock: "Vicious Circles in the Psychoses," *THE MEDICAL JOURNAL OF AUSTRALIA*, December 13, 1924, page 662.
- (<sup>7</sup>) J. R. Lord: "Clinical Study of Mental Disorders," *Journal of Mental Science*, Volume LXXII, 1926.

#### PHYSICAL BASES OF MENTAL DISORDER, ENDOCRINE DISTURBANCES AND SEPSIS.

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I PROPOSE to deal with the focal sepsis side of our subject and to do so turn to the work of Dr. H. A. Cotton, of Trenton State Hospital, who may be regarded as a protagonist of the doctrine from the psychiatric point of view not only on account of the amount of discussion he has provoked, but also because of the daring manner in which he has put his theories into practice, and the magnitude of his therapeutic claims. He even says: "This doctrine has been the most important contribution to twentieth century medicine."<sup>(2)</sup>

He tells us how in 1905 he demonstrated certain distinct changes in the cortical nerve cells of the nature of fatty degeneration. He develops his argument to show that these changes underlie the pathology of the whole of the so-called functional mental disorders, that is manic-depressive insanity, *dementia præcox*, paranoid condition and the psychoneuroses, which should be all regarded as different manifestations of one fundamental disease. He names a number of different types of streptococci, both hæmolytic and non-hæmolytic, as well as many types of colon bacilli, the toxins of which being carried from various foci of infection in the body, are capable of producing the lesions in the cortical nerve cells.

When we are dealing with so many different organisms, it cannot be a case of a specific toxin with a specific action on specific nerve centres, as in the case of tetanus, botulism and diphtheria. If we accept the argument, I suppose that we should speak of the non-specific toxic encephalopathies and that mania, dementia, neurasthenia and so forth cannot be considered as nosological entities any more than dropsy, dyspnoea or aphasia.

How does Cotton establish his verdict of "guilty" against focal sepsis?

After he had first experimented for many years with ductless glands unsuccessfully, he came to regard changes he had found in this system as being secondary to sepsis and disappearing when sepsis was removed, but not susceptible to glandular therapy. He thus exculpated the endocrine system.

He deprecates the emphasis placed on hereditary factors and the consequent pessimism. He then quotes figures to show that no improvement has resulted from psychological methods of treatment, under which heading he includes not only the practice of the various cults, but all efforts to readjust the patient to his environment, occupation therapy, amusements and so forth. Therefore he acquits heredity and psychogenic causes.

Having proved innocent so many suspects of the crime, he still finds left one villain, focal sepsis, and he spares no pains in tracking him to his lair. The proof of guilt lies in the striking results obtained from the offender's punishment.

The monster is driven from his first haunts by ruthless extirpation of teeth (100% of cases) and wholesale enucleation of tonsils (76% of cases). But already he has slipped on further, so that it is necessary for the patient to swallow a Rehffuss stomach tube and to suck it long tedious hours; then weeks of vaccines and sera (83% of cases). Barium meals and enemata are employed as detectives and more vaccines and sera sent to arrest the criminal. But he is elusive and penetrates to the strangest hiding places by the most mysterious pathways. The *cervix uteri*, even in the virgin, is a favourite haunt and must be amputated (80% of cases). But justice may still be tempered with mercy for we read: "This operation will frequently conserve ovaries and tubes" and "We have performed only 38 (total) hysterectomies in 750 operations." And let not the male console himself that he escapes here, for his seminal vesicles are often suspect and can be treated only by excision. It is not the case of gonorrhœa at all, which "has not been found to play any rôle in either male or female," but only infection spread from the oral cavity—surprising surely when we reflect what a bugbear secondary infection is to the expert in venereal diseases.

Sometimes the pursuit may be stayed here; but not often. If there is no improvement, the colon must be "investigated and resected." At first only the caecum and ascending colon were taken, but it was soon found necessary to remove the entire colon (20% of cases). It does not matter if 30% of patients succumb; they are saved from the dreadful morass of dementia. It is claimed that after all this has been done, 82% of patients have recovered and the case for the prosecution seems well established. Yet it must be admitted that the evidence is largely circumstantial; it depends on alibis for all other suspects and a number of figures, which it will be well to examine further. We might call in question the value of those alibis, but let us rather sift the positive evidence given in the figures.

It sounds very striking to speak of 82% of recoveries, but 82% of what? I have carefully examined two papers of Cotton<sup>(1) (2)</sup> which cover



the same ground, but can find it nowhere explicitly stated. In one paper<sup>(2)</sup> a table is given entitled "Discharges in Functional Group, April 1, 1918, to April 1, 1922," in which the total "Recovered and Improved" is 1,412; the other headings "Unimproved," "In other hospitals," "Returned and still in hospital" bring the total to 1,720. Now, 1,412 is 82% of 1,720. The recovery rate then is 82% of the discharges. But we are told nothing of the total admissions to the institution nor of the proportion that are diagnosed "Functional Psychosis." Nor are we shown that the ratio of "Functional Psychosis" to total admissions is the same before as after 1918. We are indeed informed that 380 patients in this group were admitted in 1918 and 40% were discharged as recovered in the first year. But the majority of recoverable affections do not last longer than one year and I suspect that many institutions could claim figures as good, when it is remembered that no cases of congenital defect, general paralysis of the insane, senile nor organic psychosis are to be taken into account. Again, whereas the population of indigent patients would have increased by three hundred in four years at the rate of increase previous to 1918, it did actually increase by only seventy-one. But we have learned that 30% of the patients subjected to colectomy perish, while the mortality from other procedures is not divulged. How far did this mortality contribute to save the State maintenance expenses? Dare one suggest that an institution in which such radical procedures are practised, may acquire a reputation calculated to diminish its admission rate? And still more its readmission rate?

Clearly, then, we can form no opinion from these very partial statistics except that fearful mutilations are carried out at the Trenton State Hospital. In the place of proof we find only a specious hypothesis, supported by figures so biassed as to tempt us to doubt the fair mindedness of the proponent. More valuable is a paper by Kopeloff and Kirby,<sup>(3)</sup> who take us more fully into their confidence in an experiment with one hundred and twenty patients, all of whom were carefully examined, the aid of competent specialists being called in to determine "focal sepsis." Sixty-two of these were used as controls and in fifty-eight every effort was made to eliminate "focal sepsis" by operation and other means. Very full statistical tables are given and we feel that the authors justify their claim that no relation between focal sepsis and the functional psychoses has been shown. Of course, it would be wrong to maintain that an experiment of this sort concluded the argument. But it gives us some justification for throwing the onus of proof on the advocates of focal sepsis and deprecating such wholesale mutilation. And we would put forward the suggestion that instead of attributing a common effect to a multitude of purely hypothetical toxins produced by a multitude of organisms, it would be more valuable to seek for a specific toxin produced by a specific organism and causing a specific lesion. Indeed we are not without evidence in this direction, if we take into account an infection of the brain, namely, *encephalitis lethargica*. The reports of

cases now abound and each of us must have seen them in his own practice, in which conditions indistinguishable from the "functional psychoses" are sequelæ of this disease.

In my own practice in a mental hospital I cannot avoid the feeling that my patients have received too many surgical attentions rather than suffered from neglect. In new admissions a very large proportion are edentulous and the female abdomen, on which the surgeon has not left the mark of his handiwork, is almost in the minority. Of course, it is not suggested that these procedures have been unnecessary, but I think that consultation with a psychiatrist would lessen their number. For instance, there are two male patients under my care, on whom laparotomies were performed with negative findings on account of the delusion that the bowels were obstructed. The female patient, when her psychosis is of insidious onset, will as often as not seek the aid of the gynaecologist before that of the psychiatrist, I am afraid not always without risk of becoming unsexed. It is pertinent that it is stated that postoperative psychosis is four times as frequent in women as in men,<sup>(4)</sup> but in operations common to both sexes the proportion is about equal.<sup>(5)</sup> May it be sometimes that it is not the operation that is at fault, but the diagnosis? That it is a *post hoc* and not a *propter hoc*? The subject of failing mind, who finds it more and more difficult to take normal interests, readily becomes obsessed with her sexual organs and the symptoms of which she complained before the operation, have indeed been those of incipient psychosis. The male, while no freer from these obsessions, is protected by his different anatomy from the same weight being placed on his symptoms.

#### References.

- <sup>(1)</sup> H. A. Cotton: "The Etiology and Treatment of the So-Called Functional Psychoses," *American Journal of Psychiatry*, October, 1922, page 157.
- <sup>(2)</sup> H. A. Cotton: "The Relation of Chronic Sepsis to the So-Called Functional Mental Disorders," *Journal of Mental Science*, October, 1923, page 434.
- <sup>(3)</sup> N. Kopeloff and G. H. Kirby: "Focal Infection and Mental Disease," *American Journal of Psychiatry*, October, 1923, page 149.
- <sup>(4)</sup> G. H. Rohé, quoted by Gilbert Brown: "Postoperative Psychoses," *THE MEDICAL JOURNAL OF AUSTRALIA*, October 10, 1925, page 451.
- <sup>(5)</sup> Sears, quoted by Gilbert Brown: "Postoperative Psychoses," *THE MEDICAL JOURNAL OF AUSTRALIA*, October 10, 1925, page 451.

#### THE PHYSICAL BASIS OF MENTAL DISORDER, FOCAL SEPSIS AND ENDOCRINE DISORDERS.

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It is a well-established fact that toxæmias arising from septic foci in the body may give rise to chromatolysis of the cortical cells with subsequent mental confusion, with or without auditory and visual hallucinations and other mental phenomena.

The septic focus may be anywhere in the body; but the teeth, tonsils, antra, the urine, the faeces form the favourite hunting ground of psychiatrists. Sometimes the focus can be localized with great accuracy. A former patient of Gladesville Hospital who had been in a state of resistive stupor for two months, recovered rapidly when a set of septic teeth was removed. Another patient, who was in a state of acute confusional insanity, recovered perfectly when a septic sore on his leg healed up. In other similar patients in whom the focus is not so apparent, the administration of a vaccine prepared from the urine or the faeces or from any other site of injection is often followed by gratifying and encouraging results.

In a similar manner is it well established that primary disturbances of the endocrine glands may be followed by definite mental diseases. As proof of this statement it is merely necessary to recall to your minds myxœdema, cretinism, the exophthalmic goitre insanities, the mental symptoms found in pituitary dystrophies and the like.

Now it must be admitted that patients suffering from the acute confusional states considered above, together with patients the victims of proven endocrine disturbances form but a very small percentage of all patients admitted to mental hospitals. There remains a very much larger number suffering from the various psychoses as primary dementia, the manic-depressive insanity of Kraepelin, paranoia and the paranoid conditions, senile psychoses and the like. Alcoholic and syphilitic insanities, organic dementia and similar conditions are not considered here.

What part do focal sepsis and endocrine disturbances play in the causation of these diseases?

Here it must be confessed that, in spite of a literature so large that it is impossible for one to keep in touch with it all, the essential basis of the psychoses remains as obscure now as it was thirty or forty years ago when these conditions were first differentiated. Yet withal many pertinent facts have been discovered. The "mind" may affect the endocrine glands. Witness the great outpouring of adrenalin in states of fear and again the vagaries of menstruation in times of great mental stress. Endocrine disturbances may profoundly affect the "mind." Witness the mental inertia of the cretin, the hyperactivity of the patient with exophthalmic goitre, the profound mental alterations at puberty.

It is only natural then that psychiatrists should follow the prevailing fashion of modern medicine and seek in the fashionable endocrine glands an explanation of the mysterious phenomena of insanity.

Sir Frederick Mott described certain degenerations in the ovaries and testes of many primary demented, whilst the Abderhalden reaction in *dementia præcox* is elicited to the sex-glands in at least one-half the patients suffering from this disease.<sup>(1)</sup> Again it is well known that many primary demented have an extraordinary tolerance for thyroid gland given by the mouth. In some such patients up to 3.6 grammes (sixty grains) of

thyroid extract can be given daily without any appreciable rise in temperature or in the pulse rate. Again in many patients admitted to mental hospitals evidence of endocrine abnormality may be seen, dry and coarse skin and hair, the much vaunted thinning of the lateral third of the eyebrows, facial hair on women, gynomastia, small or enlarged testes, small or enlarged thyroids and what not. Are all these endocrine disturbances secondary to changes, whether primary or secondary, of brain cells or are they primary factors in the patient's condition? With jesting Pilate of Bacon's Essays we ask: "What is truth?" and will not stay for an answer.

It is certain, however, that endocrine therapy in mental diseases is disappointing. We give our primary demented courses of thyroid therapy with most discouraging results. We put many of our patients on glandular extracts, thyroid, "Varium," "Hormotone," bewildering and fantastic and absurd combinations of the various ductless glands with uniformly disappointing and discouraging results. Even in menopausal insanity, in which it would appear that at least a causal factor of the patient's condition is some subtle alteration of the ovarian secretion, I have found that glandular therapy has little or no influence on the course of the disease.

It seems to me then that the search for the basic factor in the causation of mental disease must be extended much further than mere endocrine disturbances. It is an established fact that only certain predisposed persons become insane. They cannot withstand the stress and strain of life as normal people can.

To hide our ignorance of the real explanation we say glibly that these patients have an innate instability of the cells of their frontal and prefrontal areas. We ask ourselves again and again why are the neurones unstable? What factors make them unstable? Is the instability innate and primary in the cells themselves, the result of a psychopathic inheritance or is it secondary to subtle bodily changes in the blood, in the viscera, in the endocrine glands or to toxæmias acting together or independently? Again we ask: "What is truth?" and will not stay for an answer.

However, in 1922 Cotton startled the whole wondering world of psychiatry by dogmatically asserting that focal sepsis was at the base of all mental disease.<sup>(2)</sup> The area of focal sepsis may be in teeth, in the tonsils, in the stomach, in the colon, in the *cervix uteri*, in fact anywhere in the body. Whatever be its site, not only must this area of focal sepsis be eradicated (if necessary colectomy or hysterectomy must be performed), but also the toxæmia must be vigorously combated by autogenous vaccines.

Thus with one sweeping statement would Cotton have us abandon our pet theories of psychiatry and would have us adopt a most simple explanation for all the mysterious phenomena of mental disease.

Now one is willing to admit that all the various psychoses may be merely symptoms of one disease process; for do we not see all mental syndromes simulated by alcoholic and syphilitic insanities or

by the sequelæ of *encephalitis lethargica*. But the evidence adduced in favour of focal sepsis is that common disease process is incomplete, unconvincing and unproven. Cotton claims 82% of his discharges as recoveries. He carefully makes no reference to general paralysis of the insane, mental defectives, senile dementis, organic dementis or even to the number of deaths occurring in his hospital. If all these things be excluded, any hospital which makes no speciality of focal sepsis therapy, can claim between 80% and 90% of their discharges as recoveries. Again in the famous controlled experiment by Kopeloff and Kirby in New York it was proven that the removal of septic foci was of no appreciable therapeutic value in their patients.<sup>(3)</sup>

The fact remains that in 90% of our patients we can prognosticate with reasonable accuracy the probable end result of their disease. As our experience grows, we learn to recognize those patients who will recover, and although we often submit these patients to endocrine therapy, the thyroid-manganese treatment and other fanciful treatments, we know in our own heart and soul that these patients would have recovered equally as well on the usual hygienic, symptomatic treatment of mental disease.

The riddle of the psychosis is still unsolved. Some seek the explanation in the endocrine glands, others in the focal sepsis theory.

The fact remains, however, that in spite of all that has been written on both theories, the understanding of the psychoses is still shrouded in profound obscurity and their treatment is still purely empirical and symptomatic.

#### References.

<sup>(1)</sup> W. H. B. Stoddart: "Mind and its Disorders," 1921, page 342.

<sup>(2)</sup> H. A. Cotton: "The Etiology and Treatment of the So-called Functional Psychoses," *The American Journal of Psychiatry*, October, 1922, page 157.

<sup>(3)</sup> N. Kopeloff and G. H. Kirby: "Focal Infection and Mental Disease," *The American Journal of Psychiatry*, October, 1923, page 149.

Dr. J. McPHERSON (Kihikihi) referred to the pathological equipment required for mental hospitals. The laboratory work done in them in New Zealand since the war had been very small and he was rather sceptical of the utility of that which had been done. Even the work of Sir Frederick Mott had recently been questioned. Regarding the cure of general paralysis of the insane, the latest reports were disappointing. It was too soon to talk of a cure of general paralysis by malarial treatment.

He had had long experience in general practice and his impression had been that *pyorrhœa alveolaris* was rather a protection against mental disorder than a cause of it. Much of the endocrine therapy, in his experience, was very disappointing.

Dr. H. F. MAUDSLEY (Melbourne) said that there was a strain of pessimism among medical men concerning mental disorders, in some respects due to the strong public prejudices against anyone who had been certified. The possibility of cure was greatly increased by getting the patients early, before the psychosis was thoroughly established. Out-patient clinics were very necessary and very effective. There was much need for general education.

He had had good results in the malarial treatment of general paralysis of the insane, though it was too early to state that the patients had been cured. There was often a difficulty in getting the malarial parasite and some place

should be established from which a supply could be dispatched.

Dr. ST. L. GRIBBEN (Auckland) said that in Edinburgh good results had been obtained in the patients with early general paralysis of the insane treated by malaria. He further elaborated the system of pathological investigation, outlined in Dr. Latham's address.

Dr. S. A. MOORE (Dunedin) referred to the focal sepsis side of the question. In a number of his patients the clearing up of foci of infection had resulted in considerable amelioration of the mental symptoms. He had seen patients with rheumatoid arthritis in whom improvement of the general condition had been accompanied by a corresponding improvement in the mental condition.

In endocrine therapy he had had good results only with thyroid administration.

Dr. O. LATHAM replied to a few questions that had been raised and summed up the discussion. He appealed for a broad-minded view of the whole position.

### SECTION IX.—PEDIATRICS.

#### INFANT FEEDING.

By A. JEFFERIS TURNER, M.D.,  
Brisbane.

My first duty is to thank you for the honour of presiding at this Section. I thank you on my own behalf and for the State which I represent. It is a far cry from Queensland to the southern extremity of New Zealand. You rejoice in a more rigorous climate, while a large part of Queensland lies within the tropics and the remainder is subtropical. As compared with the Australian Commonwealth as a whole, Queensland has a lower death rate and a lower infantile mortality, but both are considerably in excess of those of New Zealand. Your State has an honourable preeminence in both and your records of infantile mortality and the work of Sir Truby King in promoting infant welfare are deservedly famous throughout the world. One of the principal objects of my visit here is to investigate, as far as I can, the reasons for the difference in the infantile mortalities of our two States. They are not climatic. We have a population of 100,000 in our tropical coastal district, among whom the infantile mortality compares favourably with that of the rest of the State, in spite of a deplorable ignorance of the elementary principles of mothercraft. With this corrected I do not despair of the mortality rate becoming even lower than in New Zealand. The virility of our population is demonstrated by our footballers who have been able to meet even those of New Zealand not without success.

My second duty is to open a discussion on infant feeding, speaking no longer *ex cathedra*, but in the arena open to your criticism. The subject is well chosen; two aspects of it impress me greatly: its extreme theoretical difficulty and its immense practical importance. As to the former I intend to avoid dogmatism; as to the latter to limit myself to my own experience. The only dogmatic statement I have to make is that breast feeding is greatly superior to any method of artificial feeding. It is probably unnecessary to defend this statement in this Section. I imagine that your low infantile mortality in New Zealand is very largely due to



care in instituting and maintaining feeding from the breast. In Queensland there is much carelessness and indifference among many medical men and nurses in both respects and an amazing ignorance among mothers. Probably conditions are the same in the other Australian States and in their improvement lies the best hope of diminishing our infantile mortality.

Assuming, as I think I am entitled to do, the great superiority of human milk for human babies, we may yet inquire why it is so superior. To this question we can, I think, give no adequate answer. It might naturally be supposed that the reason lay in its percentage composition. In *The Australian Journal of Experimental Biology and Medical Science* for 1926 you will find careful analyses by Dr. Wardlaw and Dr. Dart of the milk of one hundred and twenty apparently healthy Australian mothers suckling apparently healthy infants. The milk was obtained by expression and care was taken to empty the breasts as completely as possible. Nothing can be more striking than the variability of the results obtained. The percentage of fat varies from a minimum of 2.3% to a maximum of 10.3%. Their results may be tabulated as in Table I.

TABLE I.

| Fat in Milk. | Number of Mothers. |       |
|--------------|--------------------|-------|
| Under 3%     | 11                 | 30%   |
| 3% to 4%     | 25                 |       |
| 4% to 5%     | 30                 | 53.3% |
| 5% to 6%     | 34                 |       |
| Over 6%      | 20                 | 16.6% |
|              | 120                | 99.9% |

The average was 4.9%, but it is evident that only a small proportion of these infants got milk of average fat content. If we count all the analyses between 4.75% and 5.25% they are only fourteen, that is 11.7% of the whole. Half of the samples were between 3.86% and 5.75%.

The percentage of protein varied from a minimum of 0.44% to a maximum of 2.77%. The average was 1.41%. The tabulated results are given in Table II.

TABLE II.

| Protein in Milk. | Number of Mothers. |       |
|------------------|--------------------|-------|
| Under 1%         | 13                 | 10.8% |
| 1% to 1.5%       | 58                 | 48.3% |
| 1.5% to 2%       | 39                 | 32.5% |
| Over 2%          | 10                 | 8.3%  |
|                  | 120                | 99.9% |

Half of the samples were between 1.15% and 1.58%. The proportion with 1.75% or over was 15%. Nature is evidently extremely careless in her

percentages of protein and yet all these babes appeared to be doing well.

The percentage of lactose was much more constant, the minimum being 4.9%, the maximum 7.2% and the average 6.4%. The tabulated results are given in Table III.

TABLE III.

| Lactose in Milk. | Number of Mothers. |        |
|------------------|--------------------|--------|
| Under 6%         | 5                  | 4.2%   |
| 6% to 7%         | 113                | 94.2%  |
| Over 7%          | 2                  | 1.7%   |
|                  | 120                | 100.1% |

Half of the samples were between 6.36% and 6.55%.

A striking contrast to the former tabulations and making their variability all the more conspicuous.

We may draw several conclusions of practical importance from these figures.

1. Very considerable deviations from the average composition of breast milk are of little importance provided the infant is thriving. Cases in which breast feeding does not prove satisfactory, either because the supply of milk is insufficient or because the infant is fed too frequently or too much, are common and should be corrected quantitatively. As breast milk varies much in caloric value, the actual quantity of milk required to nourish an infant adequately must also vary. As a general rule the infant regulates the quantity it takes satisfactorily, provided it is not fed too often. Sometimes it is necessary for the physician or nurse to restrict the quantity taken and this is more likely to be the case with milk of high caloric value. Analyses of breast milk may be very misleading, if its variability is not recognized and should be very seldom necessary, except in the case of premature or weakly babies who are being fed on rationed quantities of milk obtained from a wet nurse.

2. Recently the manufacturers of a well-known brand of dried milk for infants have offered to make free analyses of mother's milk for medical practitioners. This will, I am sure, do much harm, if encouraged. It will certainly please those mothers who are convinced that their milk "does not agree with baby," for on analysis (even supposing the sample to be a fair one of the whole content of the breast), their milk will seldom be found "normal," that is to say of average composition. The consequence will naturally be a larger number of infants fed on dried cow's milk and a higher infantile mortality.

I do not contend that the composition of breast milk is of no importance. On the contrary, a series of analyses by an impartial expert might give us results of scientific and practical value. Of the one hundred and twenty infants in the series of Wardlaw and Dart none showed any material

departure from the normal and none had had any serious illness, but six gave a history of occasional "diarrhoea and green motions." In all these six the percentage of milk protein was high and in two of them the fat percentage was also high. In a larger number, however, even higher percentages had not apparently caused any digestive disturbance.

3. The analyses show differences between the average composition of the milk of Australian women and the average based on European and American analyses. The percentage of lactose is slightly lower, 6.5% as against 7%; perhaps this is not of much importance. The percentage of fat is considerably higher, nearly 5% as against 3.5%. This is partly due to the large proportion of *primiparae*. In *multiparae* the lower percentage of fat was more than compensated by the larger volume of milk obtained by expression. These high fat

TABLE IV.

| Parity of Mothers. | Number of Mothers. | Average Volume of Sample in Cubic Centimetres. | Average Fat Content. | Average Weight of Fat in Grammes. |
|--------------------|--------------------|--|----------------------|-----------------------------------|
| <i>Primiparae</i>  | 65                 | 63.7   | 5.16%                | 3.29                              |
| <i>Multiparae</i>  | 56                 | 69.7   | 4.75%                | 3.32                              |

percentages are remarkable. They may partly explain why Australian breast-fed infants are heavier than those of Europe and America. Perhaps they have some relationship to the fact that over-feeding with breast-milk is rather a common cause of infantile trouble in Australia.

Our methods of artificial feeding are based mainly on empiricism and we cannot therefore expect universal agreement, though by frank interchange of opinion we may make some approximation to it. We find very great variations in the tolerance of even healthy infants for the foods we consider the best and have learnt the necessity of adapting the food to the individual infant. To some extent, by care and much patience, we may adapt the infant to his food, but this is a slow process and not always successful. Our success will be proportional to the flexibility of our methods, not to their rigidity. If we succeed in obtaining the same result in different cases by foods of somewhat different composition, we are only imitating Nature, who does the same thing. We must, of course, obey certain conditions. The basis of our food must be cow's milk or its only available substitute goat's milk. It must include all the elements necessary for nutrition including the vitamins and these should be present in approximately correct proportions. We know from the analyses of human milk that these proportions are elastic and we know from experience that in special cases even these elastic proportions may be sometimes exceeded. Owing to the many and profound differences between the composition of cow's milk and human milk, we can never imitate the latter closely and for the success very frequently, though by no means always, obtained with artificial

feeding we must credit the reserve digestive powers of the infant.

We have two methods of calculation which are useful checks on our methods of feeding. Firstly the percentage composition of the food. For reasons already given I consider that to aim at exact precision in this respect, ignoring the qualitative differences between cow's milk and human milk and the variability of both, is unnecessary and unwise. I think it would be unwise to attempt to give cow's milk mixtures with a fat percentage of 5% as found in the milk of Australian mothers. The experiment might be interesting, but I do not propose to try it. The second method is that of calorie estimation. While a sufficient caloric content is essential to nutrition and growth, any excess of quantity in artificial feeding is much more deleterious than in breast feeding. But neither direct calorimetric experiment nor calculation of average diets can give us the exact requirement of any particular infant. This we can ascertain only by careful trial. The calorie consumption by muscular exertion depends on temperament and other incalculable factors. A rough classification according to age, weight and nutrition into forty calorie, fifty calorie and sixty calorie babies per pound *per diem* is helpful only as a general guide, but it will at least prevent us from expecting nutrition to be maintained on an impossibly low diet or from ordering a diet grossly exceeding the infant's wants.

It is easy to calculate calories; it is much more difficult to know how many calories are given to the infant. We usually assume that an ounce of cow's milk contains twenty calories. Probably this is too low for really good milk, but not for town milk. Milk from Jersey cows will contain twenty-five calories and I have known this difference to cause a very serious upset in an infant who was being carefully fed. The persistence with which mothers calculate in tablespoonfuls, is fatal to accurate measurement. They must be trained to think in fluid ounces and even if they do not use a glass measure, the marks on the feeding bottle are usually fairly accurate. Solids such as cane sugar and milk sugar are much more difficult. It is necessary to insist on flat teaspoonfuls and better to use a teaspoonful measure issued by the dried milk manufacturer. I use one issued by the makers of "Lactogen." They have varied its size more than once, but will now, I hope, keep it constant. A flat teaspoonful of cane sugar by this measure weighs  $40 \pm 1\frac{1}{2}$  grains, which is about one-eleventh of an ounce and contains eleven calories, provided the sugar is quite loose; if the sugar is pressed or packed, it weighs about five grains more. Sugar of milk is a fine powder easily compressible. If loose the flat teaspoonful weighs  $28 \pm 1$  grains, about one-fifteenth of an ounce containing eight calories. If packed it weighs  $44 \pm 2$  grains or about one-tenth of an ounce containing twelve calories. The difference is considerable. All measurements should be made loose, packing introduces an unnecessary variable, which cannot be controlled. When one endeavours to estimate how much "Lactogen" a baby

is taking, the difficulties are baffling. Let me report the result of one experiment. I asked five nurses at my clinic to measure me a tablespoonful of "Lactogen," all using the same measure. Three measured it loosely, forty-six grains, forty-two grains and forty-three grains respectively. The fourth packed her "Lactogen"; it weighed sixty-seven grains. The fifth packed it with great determination; it weighed ninety-two grains! Using the newest model and weighing with great care I obtain  $48 \pm 2$  grains. If, however, the scraping knife is held with the blade inclined forwards the average weight is four grains more. By tapping the spoon lightly on the table the weight is increased by five grains. Forty-eight grains is about one-ninth of an ounce. An ounce of "Lactogen" therefore contains nine tablespoonfuls. I have no doubt as to the accuracy of my observations. But the Royal Society for the Welfare of Mothers and Babies of New South Wales asserts that it contains only six tablespoonfuls, which would contain about seventy-three grains each. Either their spoonfuls are packed or else different samples of "Lactogen" differ in consistence to a considerable degree. To estimate the amount of dried milk a baby is getting, unless this is measured and weighed before your eyes, is almost impossible and any calculation of the number of calories is foolishness. One must, therefore, be guided solely by the baby's condition and his weight chart. It is easy to advise that he have less or more without knowing just how much he is getting.

Success in infant feeding depends firstly and chiefly on keen clinical observation combined with careful weighing and secondly on the food chosen. It is much better to make oneself thoroughly experienced in a few simple food mixtures, than to dabble with a great many. I shall very briefly indicate those which I use as a rule. I prefer fresh cow's milk, when procurable, to the dried milks, although I have had often to use the latter and have no doubts as to their nutrient value. The former is, I think, better tolerated and is certainly much more easily controlled. Very seldom do I use mixtures weaker than one-half milk and I endeavour to work up to two-thirds milk. The carbohydrate is made up with saccharose, lactose or dextrimaltose. Lactose is always used when the infant is partly on the breast on account of its lack of sweetness. I do not know that it has any other advantage. Dextrimaltose is, I think, very useful in many cases and has a slight aperient action counteracting the constipating effects of cow's milk. I have not seen any distinct advantage in the use of barley-water as a diluent, though I have no objection to it. I keep my fat percentages low and do not add much cod-liver oil emulsion, if any. The protein percentage of about 2.4 may be considered high, but is within the limits of healthy human milk. Cow's milk is unfortunately deficient in albumins and this deficiency is increased in proportion to the dilution. Of the casein all is not always assimilated. If assimilated, I have not seen it do harm. I frequently give undiluted cow's milk to infants twelve months old or younger. When I find an infant has difficulty

in digesting cow's milk, I sometimes add citrate of soda, but never more than four or five grains in each feed. When this has failed, I have usually resorted to peptonization for forty-five minutes at body temperature, giving the mother detailed written or printed instructions. This method seems to have gone out of fashion, but it is just as effective as ever it was and has served me well in numberless cases. Lately I have tried the addition of lactic acid in place of peptonization and the results obtained have been very promising. I have used a proprietary preparation which on analysis was found to contain: sugars 70%, lactic acid 4.9%, water 25.1%. One ounce of this is gradually stirred into sixteen ounces of cold scalded milk. I have quite recently tried the addition of this proprietary preparation to "Lactogen," but it is too early to pronounce an opinion on its use in this way. I am quite prepared to believe that others obtain as good results as myself with different methods. If I can be convinced that their results are better, I am quite willing to adopt their methods.

#### INFANT FEEDING.

By SIR F. TRUBY KING, C.M.G., M.B., B.Sc. (Public Health),  
(Edinburgh),  
*Director of Child Welfare for New Zealand, Wellington,  
New Zealand.*

WE must all feel greatly indebted to Dr. Jefferis Turner, the President of the Pædiatric Section, for giving us the benefit of his personal experience in Queensland and his conclusions as to the causes underlying the wide variations in infantile mortality rates within the Australian Commonwealth and in New Zealand and elsewhere.

I must also thank Dr. Turner for his personal impressions as to the applicability and value or otherwise attachable to the use of scientific data and principles in infant feeding, compared with trusting in practice rather to the appetite and other self-adjusting, self-regulating tendencies and powers of the organism, both as regards the quality and percentage composition of food, whether the child be breast fed or fed artificially.

I entirely concur with Dr. Turner's definite and emphatic statement that geographical position, climate and relative density of population in the various States and cities of the Australian Commonwealth and elsewhere play a very small part in the problem of infantile mortality. Otherwise, why should subtropical and tropical Queensland compare so favourably with Tasmania or Sydney with Hobart or Auckland with Sydney, which is the same latitude, or London with England as a whole or New York with the United States?

There is nothing in the slightest degree unreasonable in our President's confident anticipation and prophecy that in the near future Queensland by concentrating attention on child welfare will achieve



in the course of the next few years an even lower infantile mortality rate than now obtains in New Zealand. I heartily hope she will and I also hope and expect that the next few years will see a great further reduction in our own rate, especially in the deaths which now occur in the first month of life. This I confidently expect to reduce to half the present rate, thereby alone bringing down our total infantile mortality in New Zealand from under 4% to only 2½%.

Let me now turn to the question of how far fundamental first principles and the findings of science can help and guide us in the daily practical routine of infant feeding. As Dr. Turner says, the problem appears at first sight, especially in the various textbooks, to bristle with bewildering complications and the busy general practitioner not unnaturally tends to rely on what may seem to him at the moment to suit the particular child, rather than resort to weighing, measuring and calculating, without which, as Lord Kelvin said long ago, we cannot be said to have even the beginnings of science and scientific method. However, the fact that the problem of infant feeding does at first sight appear to be extremely difficult, complicated and bewildering is surely the strongest of all arguments in favour of availing ourselves of the understanding and simplifications which attention, observation, accuracy and the systematic habit of recording and comparing results alone can afford. As Huxley always contended: "The pity is that the public is so suspicious and afraid of the word science and that people should fail to realize that science means simplification and not complication; that science is merely crystallized common sense and needs for its understanding and practical application in daily life no faculties or powers which we do not all of us possess more or less." Or, as Dr. Harry Campbell once remarked to myself, when discussing this very question of the practical daily application of science and scientific method to feeding and nutrition during infancy: "After all one might define science as merely 'seizing the essentials.'". Of course without accurate observation and recording in figures and charts, we cannot clear our minds or convey to others what we have ascertained; we have no sound basis for making progress ourselves nor for teaching others effectively.

I cannot agree that the findings of Dr. Halcro Wardlaw and his colleagues at Sydney University give any ground for the idea that Nature is ever really erratic, careless and indifferent in such a fundamental and transcendently important matter as the proportions of carbohydrate, fat and protein in the milk of the human being or any other species of mammal. That there are occasionally wide departures from the normal average in certain individual cases has been well known for over a quarter of a century, but an enormous number of careful, systematic analyses of the milk of tens of thousands of mothers in the United States, Great Britain and notably in Germany, France and Italy, has established beyond all question the average standard composition of human milk. The general

consensus shows the human average to be about 6% to 7% of lactose, 3% to 4% of fat and from 1.3% to 1.5% of protein. Among comparatively recent investigations, made with great care and attention to coordinating the clinical and analytical sides, no observations have been of greater practical value than those made in New York by the late Dr. Emmet Holt in conjunction with Miss Fales, who found so-called "mature milk" (say from one to three months) to average about 1.5% of protein and after six months several points lower.

There is everything to gain by broadly basing the feeding of all mammals on the average composition of the milk of the particular species; if we do this, we can never go far astray. Our problem is a mammalian and not simply a human problem and neither the nurse nor the mother will ever succeed in doing the best for the baby before or after weaning (especially in so-called difficult cases) until there is some general appreciation and recognition of intrinsic fundamental differences in the composition of milks in different animal species, to meet the special needs of the creatures which differ so widely from one another in rate of growth and consequent need of flesh-forming material as the human being and the calf; or *a fortiori* between the human baby which takes six months to double its weight and the rabbit which doubles its weight in a week. One cannot justifiably ignore such considerations; they are fundamental and basic and should, of course, guide and dominate our daily practice. One might almost as reasonably propose to feed the baby on unmodified whale's milk (which contains 40% of oily fat, needed as fuel in order to keep up the temperature of a creature destined to live in cold water) as to try to feed our own progeny, against the whole facts, trend and dictates of comparative anatomy and physiology, on unmodified cow's milk—a milk specially evolved and adapted for the calf and not for ourselves.

I may point out that the admirable analytical work recorded and published by Dr. Halcro Wardlaw and his colleagues in some 120 cases would be utterly misleading if any attempt were made to use it as a basis on which to found practical conclusions as to the proportions of sugar, fat and protein suitable for infant feeding. Besides, the chemical composition of the particular samples due consideration would have to be given to at least half a dozen disturbing factors, such as the age of the mother, whether a *primipara* or *multipara*, the stage of lactation, the method of taking the particular sample, the question as to whether the breast yielded up its milk readily or held it up and, before everything else, was the particular sample first-milk, mid-milk or the residual-milk (that is, the strippings). In women, as in cows, the first milk to come off is mere skim-milk (say about 1% of fat) and the strippings average about 10%. We ourselves are infinitely more fallible and careless than Nature. Our duty is to accept and rely on Nature's infallible average, not on the variations and extremes which she may seem to allow temporarily, but which she generally balances with remarkable

care, if we judge by the complete yield of twenty-four hours, not of a few minutes or part of a single nursing or of several nursings.

It should be borne in mind that incomparably the best and most extensive scientific investigation and practical work have been done in connexion with domestic animals, not with man, as regards the feeding and care of offspring. Fully a quarter of a century ago Kellner and others in Germany and a host of workers in the United States and elsewhere arrived at certain highly important first principles. Take a single instance showing the relationship of the food of the mother to the quantity and quality of her milk supply. Kellner laid down and it has been generally accepted and confirmed, that if a cow weighing fifty kilograms is not yielding milk, she does quite well if turned out on ordinary grasses, the protein ratio of which is about one to nine; but if she is yielding four and a half litres (a gallon) of milk a day, she should have a protein ratio of one to seven; if nine litres (two gallons) a day, one to six; if thirteen and a half litres (three gallons) a day, one to five. These higher ratios of protein are readily and scientifically supplied by using clovers and lucerne or by giving oil cake. When one considers that cow's milk has a protein ratio of about one to four one can hardly expect the cow to supply the best quantity and quality of milk on grasses which have a protein ratio of one to nine.

The most essential of all points to attend to in the feeding of young mammals is the protein ratio of the food proper to the species. Von Pirquet, the greatest European authority on nutrition today, is absolute on this point and says pithily that to give excess of protein is like "burning the furniture."

The success we have had in infant feeding throughout New Zealand has been largely due to the careful education of our nurses and the fact that they are thoroughly trained to think and work on percentage lines as an important check against making mistakes and of insuring no wide departure from the normal.

The following is a copy of question and answers from the latest examination for Plunket nurses at the Karitane Hospital. There were seventeen candidates and the answers were practically identical in form of statement and working and all were correct. The time taken averaged not more than, say, twenty minutes and I submit that this shows how entirely practical and simple such calculations are and how easily it would be for members of the medical profession to avail themselves of this aid to accuracy in all doubtful cases.

Calculate and show main workings for ascertaining:

- Percentage composition.
- Total calories.
- Protein rates of the following mixture:

|                        |           |
|------------------------|-----------|
| Cow's milk             | 15 ounces |
| Lactose                | 1½ ounces |
| "New Zealand Emulsion" | 1 ounce   |
| Water to make up to    | 30 ounces |

| Ingredients.                    | Percentage Amounts of— |     |         |        | Caloric Values. |       |         |
|---------------------------------|------------------------|-----|---------|--------|-----------------|-------|---------|
|                                 | Sugar                  | Fat | Protein | Ounces | Sugar           | Fat   | Protein |
| Cow's milk                      | 5                      | 3.5 | 3.5     | 15     | 75              | 52.5  | 52.5    |
| Lactose ..                      | 100                    | —   | —       | 1½     | 150             | —     | —       |
| "New Zealand Emulsion"          | 40                     | 50  | —       | 1      | 40              | 50    | —       |
| Water to                        | —                      | —   | —       | 30     | 265             | 102.5 | 52.5    |
| Total                           |                        |     |         |        |                 |       |         |
| Percentage composition .. . . . |                        |     |         |        | 8.8             | 3.4   | 1.71    |

265 }  
44.1 } Calories of sugar.

205 }  
68.3 } Calories of fat.

52.5 }  
8.7 } Calories of protein.

643.6 = Total calories.

Protein ratio =  $582.4 \div 61.2$ :

61.2 ) 582.4 ( 9.51  
550.8  
3160  
3060  
1000  
612  
388

Answer

Percentage composition: 8.8, 3.4, 1.71.

Total calories: 643.6

Protein ratio is as one is to 9.51.

DR. JEFFREYS WOOD (Melbourne) in opening up the discussion thanked Dr. Jefferis Turner and Sir Truby King for their papers. He upheld the importance of human milk as a food. In dealing with the point of overfeeding in infants, he stated that this term was always a puzzle to him, for the baby would not take more than satisfied him. He emphasized the importance of not feeding too frequently. Holt from experiments was led to believe that a child of two months should have sixty cubic centimetres (two ounces) per feed, a child of four months one hundred and twenty cubic centimetres (four ounces), but on this amount they did not thrive well. The speaker had found from experience that a child of six days could take as much as one hundred and eighty cubic centimetres (six ounces). Often he found that constipation, poor sleep and fretfulness were due to underfeeding. His advice to parents of these children was to give large feeds. The baby was the best judge as to the amount to put in the bottle. In the early morning the child took more than later on in the day. His treatment in this case was to fill the bottle up with pure milk and to repeat it, if necessary. In some instances this treatment was not so good as full feeds on condensed milk.

DR. G. BRUTON SWEET (Auckland) agreed that the best way to feed the baby was with human milk, but if they were forced to feed artificially, the best available substitute was cow's milk. He advised those using the substitute, to keep an open mind. It should be remembered that they were dealing with a foreign substance and the only constituent in cow's milk identical with that in human milk was the milk sugar. He claimed that cane sugar was as good. In the question as to whether the baby should have a high protein or high fat diet, there were two schools. If there was a high quantity of both, trouble would ensue, but if either were kept low, better results followed. In warm climates his experience was

that with high protein and low fat percentages babies did well. It was not a question of all babies having the same food. Nature varied her milk. Infant feeding was an art. If the baby was doing well, he did not believe in altering the food. He was opposed to high fat percentages in infant feeding and referred to Sir Truby King's method. He stated that he frequently was asked about the use of emulsion. He thought that the babies did well at first, but later suffered from diarrhoea and vomiting. In that way he did not quite agree with Dr. Jeffreys Wood; however, he agreed that starvation might cause diarrhoea and vomiting. His chief difficulty in infant feeding had been the fat percentage. Protein percentages were not so difficult to arrange, but excess of protein might cause indigestion. It was safer to give high protein, however, than a high fat percentage.

DR. JEAN MACNAMARA (Melbourne) mentioned the importance of the mother's diet in some cases of facial eczema.

In reply to a question concerning bacillary dysentery, SIR TRUBY KING said that he was of the opinion that this disease had become scarce in New Zealand because of the methods of infant feeding used. Dr. Macnamara had pointed out that if bacillary dysentery could be eradicated from Australia, infant mortality there would come down to the level of that in New Zealand.

## SECTION X.—NAVAL AND MILITARY MEDICINE AND SURGERY.

### MEDICAL ORGANIZATION IN WAR.

By R. TRACY-INGLIS, C.B.E., V.D., M.B., Ch.B.,  
Director of Medical Services, New Zealand Military Forces.

I FEEL somewhat diffident about addressing you on the subject of medical organization in war as there is so little new matter to bring before you. My paper must necessarily be a compilation from the "Royal Army Medical Corps Training Manual" and the "Field Service Regulations." However, it was the wish of the members of the Sectional Committee that I should address you, as they thought it might be useful to refresh your minds on this subject prior to taking part in the medical tactical exercises on Saturday.

The army medical service in time of war is responsible to the general officer commanding for the care of the sick and wounded and their evacuation when necessary, for the administration of all medical units and advice as to their siting, for the provision of specialized medical stores and appliances, for recommendations concerning all precautionary or remedial, medical and sanitary measures conducive to the prevention and mitigation of disease and the preservation of the health of the troops. These functions may be summarized under four headings:

1. The preservation of the health of the troops;
2. The professional treatment and care of the sick and wounded;
3. The collection and evacuation of the sick and wounded from the theatre of operations;
4. The replenishment of medical and surgical equipment.

All these functions are of equal importance, although perhaps in active warfare the rapid evacuation of the sick and wounded is the most important as it has a very great effect on the

mobility and morale of the army. The preservation of the health of the troops is very important and requires the constant cooperation of not only the medical staff, but also officers and men of all units. In this respect a great deal depends on the medical officer of a unit and he will be able by his personality and active cooperation with his brother officers to be one of the main factors in keeping the unit up to fighting strength. The morale of the unit is greatly affected by his efforts.

The medical service has also to deal with the discipline, pay, clothing and disposal of all sick and wounded from the time they come under medical care until they are discharged to duty. All ranks so discharged will be returned to their own units, if possible, or will be disposed of under general instruction from the Adjutant-General's branch of the staff.

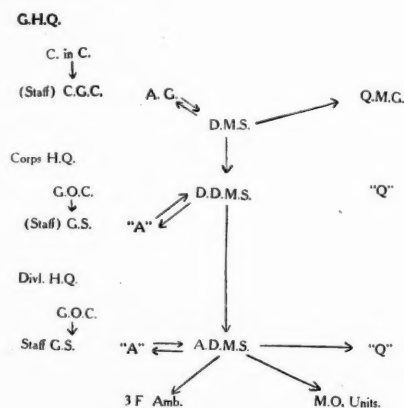
In this connexion it may be interesting to summarize briefly the duties of each branch of the staff as follows:

The general staff deals with operations, intelligence, survey and signals service.

The Adjutant-General's branch is responsible for the provision of personnel, discipline, medical and sanitary services, personal services, casualty returns and burial of the dead.

The Quartermaster-General's branch is responsible for maintenance, supply and transport, also the siting of general hospitals.

The following diagram shows the proper channels of communication:



When an army is mobilized for active service, a director of medical services or a director-general of army medical services, if the force is a large one, is appointed. He is the head of the medical services in the field and is responsible for their administration and efficiency. In purely technical matters he issues instructions to his representatives in subordinate formations and in areas. Movements of the personnel are ordered through the Adjutant-General's branch.

The commander of each formation has attached to his staff an officer of the army medical services who will be his responsible adviser in all medical and sanitary matters. Thus a director of medical ser-



vices is appointed to the staff of the army commander, a deputy director of medical services to the staff of a corps commander, an assistant director of medical services to the staff of a divisional commander. The assistant director of medical services of a division also commands the medical units of that division. These representatives are the channels of communication between the Adjutant-General's branch and the medical units and services with such formations.

The director of medical services would also have the following assistants attached to general headquarters, the number depending of course on the size of the force: A deputy director of medical services, a number of assistant and deputy assistant directors of medical services, an assistant director of hygiene who is responsible for sanitation, an assistant director of pathology, consulting surgeons, consulting physicians, inspecting dental officer and a principal matron.

When circumstances render it advisable a committee may be formed to advise the responsible military authorities in the field with regard to any special sanitary measures considered necessary to maintain the health of the troops. The principal duties of such a committee would be:

1. To assist the general officer commanding and the medical services in their efforts to preserve the health of the army;
2. To coordinate the military and civil sanitary organization of the country or area occupied;
3. To initiate important schemes of general sanitation and to serve as a board of reference for the solution of sanitary problems;
4. To visit and inspect stations or areas occupied by troops and to advise local authorities regarding special sanitary measures considered necessary;
5. To report to general headquarters any measures considered essential which cannot for any cause be carried out locally;
6. To ascertain what sanitary materials and appliances are required for the army, to recommend their supply and to see that an adequate reserve is maintained.

The director of medical services and his representatives deal directly with the quartermaster-general's branch of the staff on questions in connexion with the siting and construction of hospitals, hospital trains and hospital ships, also with regard to dieting in hospitals.

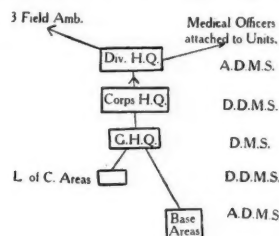
Through the Adjutant-General's branch the director of medical services or his representatives arrange such medical matters as those relating to the provision of specialized medical equipment, sanitation, invaliding, the personnel of medical services and the interior economy of medical units. The tactical dispositions of medical units during operations will be decided upon by the Adjutant-General's branch of the staff after consultation with the general staff.

The director of medical services and his representatives are thus responsible for the administra-

tion of the whole of the medical service and, subject to the policy formulated by the staff, for the provision of the requirements of the troops in so far as the medical service is concerned and also for the financial methods employed in carrying out the work. It is, therefore, most necessary that they maintain close personal touch with the staff and with commanders. The director of medical services communicates directly with his representatives and issues instructions to them on all matters of technical and financial detail connected with the medical branch.

The director of medical services details one or more of his assistants on general headquarters staff as deputy director of medical services or assistant director of medical services to administer the medical services on the lines of communication.

The chain of control of medical services in the field is well shown by the following diagram.



The director of medical services has the following "army" troops under his direct control:

Casualty clearing stations, general hospitals, convalescent depôts, motor ambulance convoys, ambulance trains and barges, hygiene sections (other than divisional), mobile hygiene and bacteriological laboratories, depôts of medical stores.

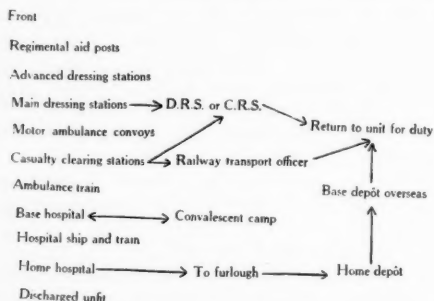
The director of medical services may decide to place any of these units under the direct control of his representative with a subordinate formation or in an area. Thus a motor ambulance convoy may be allotted to each corps or a group of general hospitals placed under the care of an assistant director of medical services. The director of medical services may also allot divisional hygiene sections to areas under the technical control of the assistant director of hygiene at general headquarters. All such arrangements must be notified to commanders of formations through the Adjutant-General's branch of staff.

As the expert adviser of the general officer commanding, the Commander in Chief, the director of medical services should bring to his notice all matters affecting the health and so the fighting efficiency of the forces. He would advise methods by which adverse weather conditions can be mitigated, also measures for protection of the troops against endemic disease.

He must satisfy himself that adequate arrangements have been made for the evacuation, treatment and accommodation of casualties. He will also appoint medical boards to deal with men sent down from the front on account of physical unfitness and arrange for their disposal. A medical board would

also deal with those in convalescent camps before being returned to duty.

In this connexion it is interesting to trace the course of a patient from the front to final disposal.



The deputy director of medical services is the representative of the director of medical services at corps headquarters. He is attached to the Adjutant-General's branch and is assisted by a deputy assistant director of medical services and a deputy assistant director of hygiene. He advises the general officer commanding corps and has similar duties at corps headquarters to those of the director of medical services at army headquarters. He receives instructions on technical matters from the director of medical services and is responsible that all necessary matters are communicated to the assistant directors of medical services of divisions and to any officer commanding corps medical units in his area. The director of medical services may also have placed under his control certain medical units in addition to the corps field ambulance. Beyond this he does not possess any power of command over the medical corps personnel in the divisions forming the corps. Should he wish to make changes in the distribution of medical personnel in divisional units, he would advise the "A" branch accordingly and orders for such moves would be issued by "A" branch.

The deputy director of medical services coordinates the medical and sanitary work in his area. Thus to economize transport he may arrange for the systematic evacuation by the main ambulance corps of all casualties from divisional main dressing stations and in the event of large operations he may establish a corps main dressing station and walking wounded collecting station. He must draw up a scheme as regards the sanitation in his area and coordinate the work of the various sanitary sections.

He should keep in close touch with the assistant directors of medical services in the corps and if possible discuss with them tactical dispositions when active operations are being planned.

An assistant director of medical services is the representative of the director of medical services at divisional headquarters and is attached to the Adjutant-General's branch. He is the technical adviser of the general officer commanding a division on all medical and sanitary matters affecting that division. He also administers the medical services of the division and commands its medical units. He

is assisted by a deputy assistant director of medical services who is also sanitary officer of the division.

He receives instructions from the deputy director of medical services on technical matters and issues orders on these subjects to the medical unit and medical personnel in the division. Orders for the moving of personnel attached to units other than medical should be issued by "A" branch of the staff.

He should keep in close touch with all units of the division and satisfy himself that the medical service is in every way satisfactory. Any men whom the medical officer of a unit considers unfit for further service at the front, are inspected by him, the list of names countersigned and passed to "A" branch. He should visit regimental aid posts and satisfy himself that the medical officer is carrying out all his duties. In this connexion he should pay special attention to the number reporting sick daily, the state of the medical equipment and the general sanitary condition of the unit's area.

In visiting medical units he should see that the sick and wounded are being properly cared for and evacuated quickly. He should discourage the retention of patients by field ambulances as this may impair their mobility. He should be on the look out for any possible waste of materials, while at the same time insuring a sufficient supply and reserve. He countersigns all indents for medical supplies.

On active service the assistant director of medical services keeps in close touch with the divisional staff in order to obtain early information of expected hostilities and so be able to deal satisfactorily with an influx of casualties. He ascertains from the general staff the scope of operations, the expected duration of the engagement, the probable number of casualties and the objective. He then decides whether the bearers and material at his disposal will be sufficient. He may have to apply to the divisional staff for men from units in reserve to act as stretcher bearers. It is his duty to detail field ambulances, to establish advanced dressing stations and main dressing stations and make all arrangements for the collection and disposal of the wounded. He will detail stretcher squads from the field ambulances to each regimental aid post to assist the medical officer and to be ready to carry the first case down to the advanced dressing station. In this way he will insure communication between the regimental aid post and the advanced dressing station. He should arrange for a reserve of stretchers, blankets, shell dressings, extra Thomas's splints, dumps being formed at the advanced dressing station or further forward if possible. He should make sure that the routes to the advanced dressing station and main dressing station are clearly indicated by directing signs and these posts clearly marked. He determines as far as possible provisional sites for new advanced dressing stations or main dressing stations. In mobile warfare the position of the advanced dressing station is usually left to the officer commanding the field ambulance. He finally submits to the Adjutant-General's branch of the staff for insertion in divisional operation orders so much of his scheme as should be known

to all the troops. Points which the staff may include in divisional operation orders are:

(i) Location of medical stations, (ii) forward limit of ambulance cars, (iii) transport arrangements for walking wounded, (iv) detail of personnel as additional bearers, (v) allotment of extra stretchers and source of additional supply, (vi) affiliation of medical units to formations.

All the above points need not always be included in divisional orders, often there is only inserted the unit responsible for evacuation and the positions of the advanced dressing station and main dressing station. The deciding factor is to include all that subordinate commanders and troops need to know.

The assistant director of medical services will then draw up his medical corps order, that is detailed instructions for the medical corps which should be approved by the Adjutant-General's branch before being issued. In this he will detail only such information as to scope of operations as will enable the field ambulance commanders to carry out their instructions. It is important to detail each field ambulance for a particular duty. Thus the divisional front may be subdivided into areas and one field ambulance detailed to each area. Or it may be more advisable to detail one ambulance to clear the whole front and keep the others in reserve until it is seen where most casualties are occurring. If the attack is on a wide front and includes flanking movements, each field ambulance might be detailed to a brigade and the officer commanding the field ambulance made responsible for collecting the wounded of that brigade.

In the case of an advance it may be necessary to detail the ambulance to open the new advanced dressing station, while the old advanced dressing station may be converted into the new main dressing station. Thus the medical corps orders should if possible give some indication as to the location of the new advanced dressing station, but the officer commanding the ambulance detailed for this purpose must be left to use his discretion as to its exact location. The officer commanding the ambulance would then notify the assistant director of medical services as soon as possible the exact location and also the position of reserve dumps of stretchers *et cetera*. The location of the office of the assistant director of medical services must be notified to all concerned and progress reports should be rendered at stated times. Either the assistant director of medical services or the deputy assistant director of medical services must remain in the office while the other is seeing that all is going according to plan.

It is most important that during an action the assistant director of medical services should keep in touch with officers commanding field ambulances, the advanced dressing station and the officer commanding the motor ambulance convoy which is clearing his area.

When active operations are in progress the assistant director of medical services must keep in very close touch with the "G" branch of the staff. In the "G" branch of divisional headquarters a

file is kept of all messages received which deal with the military situation. The assistant director of medical services should frequently see this file and so keep himself informed of the situation. In many instances during the late war the assistant director of medical services was attached to the divisional "A" mess and this practice undoubtedly led to the assistant director of medical services getting early information.

The assistant director of medical services is responsible for the correct rendition of any return required of him by the deputy director of medical service corps and the divisional staff. The "A" branch must be informed daily or as often as conditions permit of the names and units of all officers and the total numbers by units of all other ranks who have been evacuated to the list of casualties from field ambulances, or who have died while under treatment in these units.

Orders issued by the assistant director of medical services of a division are as follows: (i) operation orders, (ii) routine orders dealing with discipline and matters of internal economy of medical corps units, moves of officers and other ranks of the medical corps (copies of such orders are sent to the commanding officers of all units concerned), (iii) standing orders for the medical corps of the division. These are drawn up and issued, after approval by "A" branch, as soon as possible after mobilization.

These orders should deal with evacuation of sick and wounded on the line of march, the procedure to be adopted with regard to clerical work by the field ambulance when the division is in action, the returns required by the assistant director of medical services when the situation is normal and when a battle is in progress.

Orders with regard to sanitation are not issued by the assistant director of medical services. He makes recommendations on such matters to the "A" branch of the staff and such recommendations, if approved, are published in divisional routine orders.

During active operations the organization of the medical services is divided into three theoretical zones:

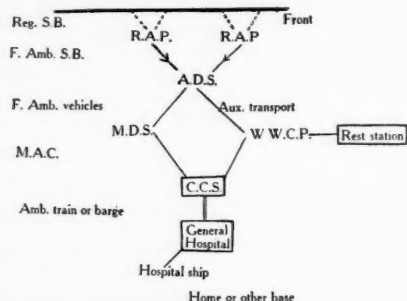
1. Collecting zone which is the area of field operations. The medical units in this zone are the regimental medical establishment, the field ambulances, sanitary section and motor ambulance convoys.

2. Evacuating zone which is the back area extending up to hospital area on line of communication. The medical units concerned are the casualty clearing stations, motor ambulance convoys, ambulance trains and ambulance barges.

3. Distributing zone. This extends from hospital area on line of communication to bases and areas outside operations. The medical units working in this zone are general hospitals, convalescent depôts, hospital ships and military hospitals outside the theatre of operations.



The following diagram explains the scheme of collecting and evacuating casualties:



A few notes regarding the various medical units working in the various zones may be of interest.

#### Regimental Medical Establishments.

A medical officer is attached to all large units. He has under his command regimental stretcher bearers, sanitary orderlies and water duty orderlies who are supplied by the unit and trained in peace time. His medical equipment is carried in a Maltese cart. The duties of the regimental medical personnel in action are to afford first aid to the wounded, to carry men not able to walk to the regimental aid post or to the nearest or most suitable cover. They should also throw up or find cover to protect the serious wounded who cannot be moved at the time. After the action, if available, they should assist the medical units to collect the wounded.

#### Regimental Aid Posts.

These are selected by the officer commanding the unit in conjunction with the medical officer. The position of a regimental aid post is necessarily dictated by circumstances, but as a rule is usually found close to battalion headquarters. In trench warfare it should be as near to the firing line as is practicable, the ideal position being about half a mile to the rear and near a communication trench leading up to the front trenches. It should again be near to battalion headquarters and if possible protected against shell and rifle fire. Any change in the situation of a regimental aid post during any advance will be at once communicated to the stretcher bearers of the field ambulance working up to it. During an attack the medical officer should as a rule be at or close to his regimental aid post.

#### Field Ambulances.

There are three field ambulances to a division and each consists of headquarters and "A" and "B" companies. Its capacity is nominally one hundred and fifty patients, but is not limited to this number. During an offensive field ambulances are required to form a chain of posts between the regimental aid posts and the casualty clearing station. The headquarters of a field ambulance may be called on to form the following posts: (i) main dressing stations (two to five miles behind front line and in the vicinity as a rule of divisional headquarters), (ii) walking wounded

collecting stations, (iii) sick collecting posts, (iv) local sick rooms in back areas, (v) rest station for division or corps, (vi) officers' rest station for division or corps.

It should be remembered that there are no stretcher bearers with the headquarters of a field ambulance. Companies of a field ambulance may be required to form the following posts: (i) advanced dressing stations (these are usually close to brigade headquarters), (ii) bearer relay posts, (iii) divisional collecting posts, (iv) advanced reserve bearer posts, (v) rear reserve bearer posts.

An advanced dressing station should be formed in a protected spot to which the ambulance transport can be brought.

#### Cavalry Field Ambulances.

There are three cavalry field ambulances per cavalry division. A cavalry field ambulance is divided into headquarters and one company. Headquarters which has no stretcher bearers, forms a main dressing station and the company provides an advanced dressing station and bearers. The personnel are carried in three-ton lorries. Its capacity is fifty patients, but is not limited to this number.

#### Motor Ambulance Convoy.

Motor ambulance convoy (medical unit) is organized into a headquarters and three sections of twenty-five cars each. One motor ambulance convoy is mobilized for each corps. The duties of these convoys are to convey the sick and wounded from field ambulance dressing stations to the casualty clearing station and from the casualty clearing station to the ambulance train or barge.

#### Auxiliary Motor Ambulance Company.

Auxiliary motor ambulance company is not under the direct control of the director of medical services, but is an army service corps unit and consists of two sections of twenty-five cars each, its function being the same as the motor ambulance convoy, but it is employed on the line of communication and at bases.

#### Casualty Clearing Stations.

Casualty clearing stations are mobilized at the rate of one per division. They require a ground space of about 250 by 150 yards and in mobile warfare are often opened at the main dressing station when that has been moved forward. Hence when choosing a site for a main dressing station this requirement should be considered. The capacity of a casualty clearing station is fifty beds and one hundred and fifty stretchers. Its transport requires ten three-ton lorries of which each casualty clearing station has two. The remainder are supplied by the army service corps. The functions of a casualty clearing station are to receive and treat seriously sick and wounded until fit for further transport, to expedite the immediate evacuation to the base of those fit to travel and to retain for early return to duty wounded and sick men likely to recover in a few days.

A casualty clearing station forms the central point upon which the collecting zone converges and from which the evacuation zone diverges and is a

most important pivot upon which the whole system of evacuating sick and wounded depends. It is divided into one light section and one heavy section. The light section equipment can be carried in nine three-ton lorries and is capable of being pushed forward rapidly as an advanced operating centre.

#### Hygiene Sections.

Hygiene sections are mobilized at the rate of one per division. They are employed to supervise the removal of excreta and refuse and in the construction of latrines and other sanitary works. They carry out the disinfection of billets, clothing *et cetera*. They are also used to supervise bathing and disinfecting stations, to supervise the purification and protection of water supplies and to act as sanitary police.

#### Ambulance Trains.

Ambulance trains are usually mobilized at the rate of one per division or sometimes at a rate of two trains for each three divisions.

#### Inland Water Transport Ambulance Unit.

The inland water transport ambulance unit consists of two barges and a tug. Each barge is fitted out as a ward. Where there are inland waterways the conveyance of patients by barges is often particularly suitable, especially for those to which the jolting by rail or road would be harmful.

#### General Hospitals.

General hospitals may be either of 1,200 beds, including 120 beds for officers or 600 beds including 60 beds for officers. General hospitals are located in line of communication areas, one at least being established at or near the advanced base.

#### Convalescent Depôts.

Convalescent depôts are classified into advanced and base and are situated in the line of communication area. The advanced convalescent depôt is situated near the railhead and is intended to receive only those suffering from minor complaints and is mainly used to relieve the pressure on casualty clearing stations.

Base convalescent depôts relieve the pressure on hospitals. They are intended for officers and men who require no further active medical or surgical treatment and who, although not fit for duty, should become so in a short time.

#### Rest Stations.

Rest stations are established as circumstances make it possible for men in need of short rest. Such establishments often form a valuable link for returning casualties to their unit.

#### Hygiene and Bacteriological Laboratories.

Hygiene and bacteriological laboratories will be formed for hospital areas or the line of communication; special mobile hygiene and bacteriological laboratories will be allotted to armies in the proportion of one hygiene and two bacteriological laboratories for each army.

#### Mobile X Ray Laboratories.

Mobile X ray laboratories are also allotted to an army.

#### Medical Stores.

Advanced depôts will be allotted and opened up in army areas at places selected by the director of medical services of the army concerned. Normally each army will require three advanced depôts.

Casualty clearing stations, field ambulances and regimental units obtain their medical and surgical supplies from these depôts.

Base depôts will be opened up under the directions of deputy director of medical services, line of communication area. Normally there will be one base depôt of medical stores for each army in the field. They should be opened at or near sea bases. General hospitals and other units on line of communication obtain their medical and surgical supplies from these depôts.

Base depôts are replenished from medical stores in the United Kingdom and advanced depôts from base depôts.

#### Hospital Ships.

The number of hospital ships required will be determined by the length of the voyage from the base of operations. Ambulance transports are also fitted to carry sick and wounded in addition to other troops and stores. They are not protected under the Geneva Convention.

So concludes these brief notes on medical organization, but one must not forget that time and place may change the ways and means of caring for the sick and wounded in war time. But the basic principles remain the same and it is only by a close study of what has been done in the past that we will be able to cope with the difficulties and problems of the future.

I have to acknowledge the valuable suggestions made by Major G. A. Gibbs, my Staff Officer. I have freely drawn on extracts from the "Royal Army Medical Corps Training Manual," "Field Service Regulations" and "Field Ambulance Organization" by Lieutenant-Colonel J. Hardie Neil, D.S.O.

LIEUTENANT-COLONEL A. R. D. CARBERY (Wellington) considered that the essential point neglected in New Zealand was the organization of the medical corps. He asked what would happen were they suddenly called upon to take the field as he knew of no scheme having been formulated. His opinion was that in the late war they mobilized too many medical troops and tried to maintain too many hospitals. He advocated the appointment of officers to the positions they would occupy in the event of war without loss of time.

#### A SELECTION OF CASES FROM AMONG NAVAL PATIENTS OF INTEREST FROM A BACTERIOLOGICAL POINT OF VIEW.

By W. E. J. PARADICE, M.B., Ch.M.,

Surgeon Lieutenant-Commander, Royal Australian Navy, Microbiological Laboratory, Garden Island.

#### Introduction.

This paper is submitted to the Naval and Military Section as it deals mainly with conditions likely to be met with in epidemic form in naval and military establishments.

### Vincent's Angina and Allied Conditions.

From the number of cases of Vincent's angina met with among naval ratings stationed at Sydney, one is forced to the conclusion that the disease is by no means uncommon.

It has been my practice to examine microscopically every tonsillar infection met with at Garden Island and in most cases a culture was also made. The way in which various organisms caused small epidemics was most noticeable; of course, this is only to be expected when dealing with men who of necessity sleep in comparatively confined spaces, such as in ships or barracks.

As a rule, when a case of "sore throat" occurs, three or four cases yielding similar bacterial flora occur within a few days.

Among the cases examined were a number which yielded a slide with Vincent's spirochaetes and fusiform bacilli in apparently pure culture. The patients at the time of reporting have a comparatively large ulcer of the tonsil or tonsils. The ulcer often undermines the tonsillar tissue and leads to a large cavity which is entered through a comparatively small opening. The base of the ulcer is extremely hard and friable; when felt with a probe or loop of stiff platinum wire there is a complete lack of elasticity and small white lumps can be broken away. This extremely hard feeling appears to be pathognomonic of pure Vincent's infection and the diagnosis can be confirmed by examining the lumps, spread as a film on a microscope slide and stained with any of the stains in ordinary use, when innumerable spirochaetes and fusiform bacilli, both large and easily recognizable organisms, will be seen. At this stage the cervical glands are slightly enlarged, hard and tender; the patient has a slightly elevated pulse and temperature and complains of slight malaise. If treatment is commenced immediately the symptoms will not increase in severity, but the condition will take a considerable time to clear up and will be very liable to relapse unless the treatment is continued for approximately a week after apparent cure.

The second type comprises cases of mixed infection in which spirochaetes and fusiform bacilli predominate. The tonsillar ulcer has the same hard friable base as in the case of pure infection, but under the microscope various other bacteria are seen to be present. The patient has a moderate elevation of temperature and pulse and within the course of forty-eight hours the temperature will rise further, even to above 39.4° C. (103° F.) and the patient will complain of severe headache, sore throat and general malaise; the cervical glands will be found to be tender to touch.

The third type also comprises cases of mixed infection, but in these the spirochaetes are present in small numbers only, the fusiform bacilli in even smaller numbers, whilst various other organisms are present in enormous numbers. The tonsillar ulcer in these cases is invariably soft and exudes yellow pus. In these cases the temperature curve varies with constitutional disturbance.

After trying a number of drugs in the treatment of these cases I have come to the conclusion that the best results are to be obtained from the following method:

The tonsillar ulcer is treated every four hours with *liquor arsenicalis* and aqueous solution of perchloride of mercury, 1 in 5,000, alternately.

These liquids are applied by means of a small amount of cotton wool wrapped round the end of a wooden applicator or probe. The applicator, after being dipped in the liquid, is worked about in the ulcer cavity, in order to remove as much of the necrotic tissue as will come away each time.

Good results were obtained by the use of *liquor arsenicalis* alone, but the perchloride of mercury improved results by causing the necrotic tissue to separate earlier than it would have done otherwise.

### Gingivitis, Yielding Vincent's Organisms.

Many cases of gingivitis are referred to me by the dental surgeons and the majority of these yield a film which under the microscope is seen to consist of about 50% spirochaetes of Vincent's type and a few fusiform bacilli, the remaining organisms being a heterogeneous mixture of bacilli and cocci of various kinds.

When *Bacillus maxims* occurs in considerable numbers in combination with Vincent's organisms, as it does from time to time, the cases are extremely resistant to treatment.

The treatment used in these cases has been local application of *liquor arsenicalis*, silver nitrate or violet rays, sometimes supplemented by intravenous injections of "Novarsenobillon."

### Balanitis Yielding Organisms of Vincent's Type.

About 1% of the men with venereal diseases treated at Garden Island are affected with balanitis yielding spirochaetes and a few fusiform bacilli among innumerable other bacteria. These are cases of the fourth venereal disease of certain writers. In these cases the glans is red and in infections of a few days' standing is superficially ulcerated and the inner surface of the prepuce is in a similar condition and perhaps oedematous. Frequent bathing of the part with any antiseptic lotion (*hydrargyrum perchloridi*, 1 in 10,000, is used at Garden Island) quickly cures the condition.

The discharge in these cases consists almost entirely of organisms, hardly any pus cells being seen.

I am of opinion that most of these infections originate from germs conveyed from the mouth in saliva, either directly or indirectly.

It is only in tonsillar lesions that Vincent's organisms occur in pure culture; elsewhere they are mixed with other organisms and the percentage of fusiform bacilli to spirochaetes is small and the transverse striations of the bacilli seen in tonsillar infections do not occur in bacilli from other sources.

(To be Continued.)



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